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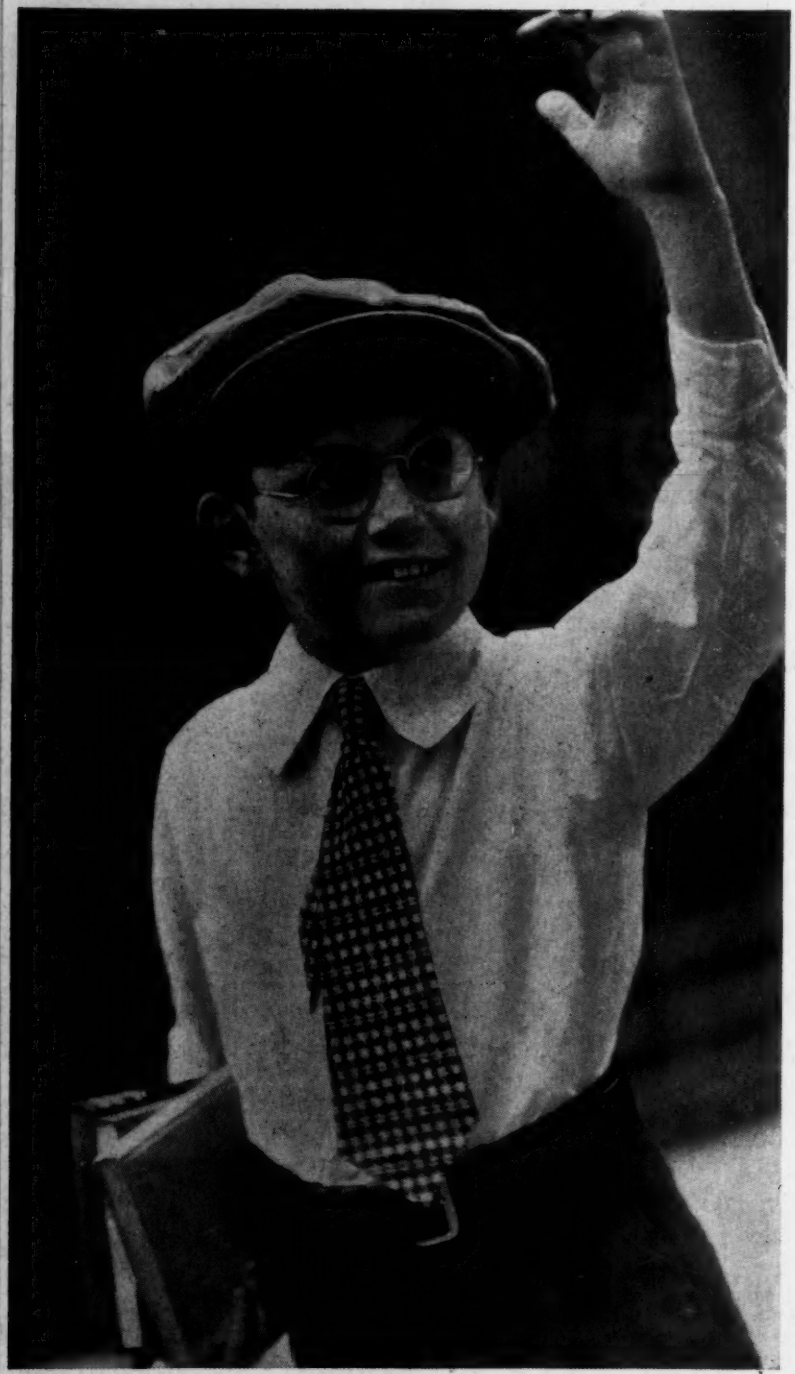

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AMERICAN JOURNAL OF OPHTHALMOLOGY
VOLUME 18 JUNE, 1935 NUMBER 6

THE INFLUENCE OF EXOPHTHALMOS ON THE FUNCTION OF PARETIC OCULAR MUSCLES

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The recti muscles of the eyes have, in addition to their principal function, another, though subordinate, function as retractors, due to which, weakening muscle operations may cause a certain amount of exophthalmos, whereas strengthening operations, such as advancement and resection, leave behind them some enophthalmos. Two cases are reported in which paretic diplopia was combined with exophthalmos. Both anomalies were removed by the aforementioned strengthening operations. One patient had an extremely disfiguring exophthalmos combined with almost total right ophthalmoplegia due to an orbital operation. Advancement and resection of both the right internal and external recti diminished the exophthalmos considerably and restored binocular single vision in the greater part of the field of fixation. The other patient had exophthalmos and diplopia caused by total paralysis of one superior rectus. Advancement and resection of that muscle, though not restoring its normal function, made diplopia disappear in the middle and lower parts of the field of fixation because the removal of the exophthalmos made it easier to maintain binocular fixation. Read before the New England Ophthalmological Society, in March, 1934.

It is a well-known fact that the recti mucles of the eyes have, in addition to their principal functions, another, though subordinate, function as retractors. This latter function, which is latent so long as the ocular movements take place to a normal extent, becomes manifest when normal movement in a certain direction is restricted or totally checked by mechanical resistance, as for instance, in some cases of congenital deficiency of abduction, resulting from faulty development of the external rectus. If this muscle is transformed into a cord of connective tissue totally lacking in muscular fibers, it cannot be lengthened simultaneously with the contraction of its normal antagonist, so that instead of an adduction movement, only a retraction of the eye will result. On the other hand, as a consequence of the paralysis of one or several recti muscles, there will occur not only a restriction of ocular movement, but also an exophthalmos, owing to the loss of the retracting function of the paralyzed muscles. Because of the disfiguring exophthalmos which remains after an unguarded tenotomy, this operation has justly been abandoned by the majority of ophthalmologists. In contrast to the weakening operations, advancement and resection leave behind them a more or less considerable enophthalmos as a sign of increased muscle strength.

Although this may be an unwelcome secondary effect of squint operations, cases do occur in which the only or the principal purpose of muscle operations may be to induce or to correct exophthalmos or enophthalmos. A disfiguring enophthalmos of traumatic origin, for example, due to fracture of an orbital wall, has repeatedly induced the ophthalmologist to tenotomize all the recti muscles in order to bring the eye forward in the socket. Such a procedure is, of course, permissible only if the eye is blind or highly amblyopic, so that no diplopia can result from the weakness of the tenotomized muscles. With regard to this successful procedure in cases of enophthalmos, one must take into consideration an analogous operative treatment of exophthalmos; namely, an advancement or resection of the recti muscles in order to increase their retracting function. In the chapter on eye-muscle operations in Graefe-Saemisch "Handbuch," van der Hoeve (1922) says: "If an exophthalmos is threatening the eye or causing

considerable disfiguration, one may bring about retraction of the eye into the orbit by shortening all the recti muscles." Whether or not this has ever been performed, and if so, who did it and with what success, I have not been able to ascertain. I can imagine that an eye physician would hesitate to operate upon an exophthalmic eye in the way just suggested if there were binocular single vision and bilateral equal mobility which might be disturbed by shortening operations on all the recti muscles. It is otherwise, however, if there is diplopia in addition to the exophthalmos.

Figs. 1-4 (Bielschowsky). Right exophthalmos and nearly total ophthalmoplegia. Fig. 1. Primary position of the eyes. Fig. 2. Looking to the right; right paresis of the external rectus. Fig. 3. Looking to the left; paralysis of right internal rectus. Fig. 4. Looking up; paralysis of both elevator muscles.

In the ophthalmic literature only two publications have been found concerning this point. Peter described (Amer. Jour. Ophth., 1930, v. 13, p. 869) a tendon transplantation for paralysis of the left superior rectus combined with recession of the antagonist in a case of exophthalmic goiter. After the operation there was no longer diplopia, and a considerable enlargement of the field of fixation was obtained. Another case of bilateral exophthalmos without other symptoms of exophthalmic goiter but with a very considerable paresis of the right elevator muscles, was observed in the University Eye Clinic in Prag and reported by Kubik (1925). After an advancement of the right superior rectus combined with a tenotomy of the right inferior rectus, there remained a residue of vertical divergence, which was removed later by a myectomy of the left inferior oblique, so that binocular single vision was obtained. In neither of these publications is anything said about the effect of the operations on the exophthalmos.

I should like to report on two such patients, on whom I have operated in order to correct or at least to diminish the disfiguring exophthalmos and at the same time to restore or facilitate binocular single vision.

Fig. 5 (Bielschowsky). Right exophthalmos and retraction of the upper lids corrected.

Fig. 6 (Bielschowsky). Looking down; equal depression of both upper lids.

A lady, 55 years of age, and goggle-eyed because of a very high myopia, noticed in 1927 a gradually increasing

protrusion of the right eye. The ophthalmologist whom she consulted suspected an orbital tumor, especially as the abduction and the elevation of the right eye were restricted. When medical treatment lasting six months had proved ineffective in preventing the continuous progress of the exophthalmos, a Kroenlein temporal resection of the lateral orbital wall was performed. A cyst the size of a small bean was found; nothing else. The operation not only left behind an increased exophthalmos, but also caused an almost total ophthalmoplegia of the eye (figs. 1-4). The depressor muscles alone still retained a limited function. The patient was very unhappy because of the extremely disfiguring exophthalmos, and also because of the disturbing diplopia. Moreover, there was a considerable lagophthalmos threatening the cornea during sleep. The striking retraction of both upper lids is seen in the illustration (fig. 1); it was caused by the continual effort to keep binocular single vision.

At first I did not expect that the function of the paralyzed ocular muscles could be essentially improved by any operation. Nevertheless an attempt had to be made, since a lateral tarsorraphy performed by the ophthalmologist did not sufficiently guard the eye from keratitis e lagophthalmo. I planned to make an advancement combined with a resection of both the right internal and external recti at the same time. The result was very much better than I had expected (figs. 5, 6): the right exophthalmos was very considerably diminished, so that both the corneal apices were now nearly in the same

Fig. 7 (Bielschowsky). Paralysis of right superior-rectus muscle; right eye deviating downward at an angle of 15 degrees.

Fig. 8 (Bielschowsky). Looking up; elevator of the right eye considerably restricted.

Fig. 9 (Bielschowsky). Looking up and to the right; no elevation of the right eye.

Fig. 10 (Bielschowsky). Looking up and to the left; equal elevation of both eyes. (Normal function of the right inferior oblique).

frontal plane; the patient could close the right eye without difficulty; and the cornea was covered during sleep. In addition, binocular single vision in a considerable part of the field of fixation was restored, so that the patient was able to go about on the streets alone again. She tells me that the gratifying

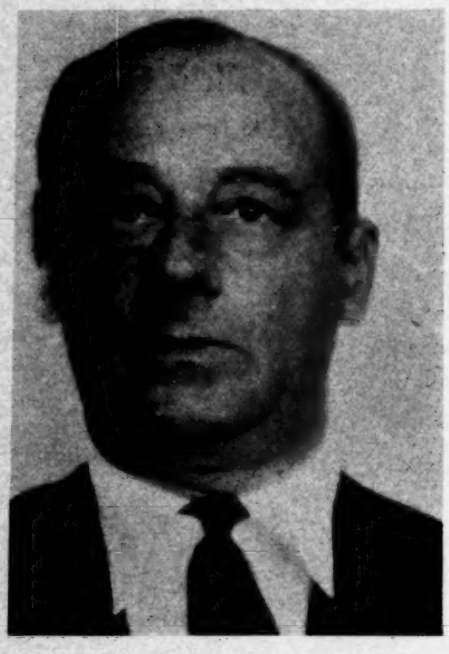

Fig. 11 (Bielschowsky). Temporary binocular fixation; right lid fissure enlarged due to right exophthalmos.

result has continued until the present; that is, five years after the operation.

This can be explained only in the following way: By the advancement and resection of the antagonistic pair of muscles, namely, the external and the internal rectus, a retraction of the right eye was effected, the consequence of which was a functional improvement of the paretic ocular muscles, slight indeed, but sufficient to bring about a considerable enlargement of the field of binocular single vision.

I was able to prove in a second case that muscular function is facilitated by the diminution or the correction of an exophthalmos. The patient, 42 years old in 1929, gave a history of having acquired syphilis 25 years earlier and of having been treated with salvarsan and mercury. Two years before consulting me, he had noticed a diplopia which did not disappear in spite of various kinds of treatment. It was the result of a total paralysis of the right superior rectus (figs. 7-10). The vertical deviation of the right eye while the left was directed straight forward, amounted to 15 arc degrees (fig. 7); it increased in the upper part of the field of fixation (fig. 8) and was at its maximum when the patient attempted to look up and to the right, because the right visual line could not pass the horizontal plane (fig. 9). In looking up and to the left, however, both visual lines could be elevated to the same level (fig. 10). The vertical deviation in looking down did not decrease but was the same as in the primary position because of a considerable secondary contraction of the right inferior rectus. As long as the patient was unfatigued and interested in an object, he was able to overcome the vertical divergence, owing to his very strong fusion power (fig. 11). But as soon as he grew tired or his attention was diverted, the paretic deviation be-

Fig. 12 (Bielschowsky). Exophthalmos relieved; lid fissures practically equal; binocular single vision.

came manifest, causing a very disturbing diplopia which took several minutes to overcome. The patient, a business man who took part daily in many con-

ferences, was very much annoyed and inconvenienced by the paresis and the necessity, when the diplopia occurred, perhaps during a conference, of having to leave the room and to try by means of peculiar exercises, which he had found by himself to be useful, to get his eyes under control again. For cosmetic reasons also the patient longed for riddance from the exophthalmos as much as for correction of the diplopia. The degree of exophthalmos can be recognized by comparing the position of the two lower lids with respect to the cornea (fig. 11).

It was not easy to decide on the best method of operative procedure. Obviously enough, a weakening of the right inferior rectus was indicated because of its contraction and the preponderant importance of the lower half of the field of fixation in the ordinary visual act. But a recession of the inferior rectus would have involved the inevitable disadvantage of an increase of the exophthalmos. On the other hand, any considerable functional improvement from an advancement of the totally paralyzed superior rectus was not to be expected, particularly for looking at objects situated in the lower half of the field of fixation. To execute both operations at the same time did not seem advisable because of the difficulty of avoiding an over-correction of the vertical deviation as well as an increase of the exophthalmos. Therefore I decided to advance first the superior rectus, in order to remove the exophthalmos, and in accordance with the result to make at some later time a carefully graduated retroplacement of the inferior rectus.

The first operation not only removed the exophthalmos (fig. 12), but also helped the patient to maintain binocular single vision more easily and therefore for a much longer time, although the function of the superior rectus had not been improved in the least and the amount of vertical deviations manifested by the elimination of the fusion tendency, was exactly the same as before (fig. 13). One year later I made a guarded retroplacement of the right inferior rectus with the best of results. The diplopia, which after the first operation had still appeared, though for only a few minutes a day, when the patient got up in the morning, disappeared after the second operation and has never returned during the ensuing years. The paralyzed muscle recovered gradually and so completely that the patient now has binocular single vision in the whole field of fixation. Considering this fact,

Fig. 13 (Bielschowsky). Looking up and to the right; paralysis of right superior rectus unaltered.

there can be no doubt that the recession of the center of motion was the essential factor in obtaining easy binocular vision in spite of the scarcely diminished vertical divergence.

In view of these results, I think it is justifiable to advance and shorten both the external and internal recti simultaneously, in order to diminish a high degree of exophthalmos which is disfiguring and which threatens the cornea, even if the patient does not suffer from diplopia. These operations, of course, can be taken into consideration only in cases of stationary exophthalmos, if an orbital tumor can be excluded, and if the presence of a strong fusion power leads one to expect that a possible slight heterophoria remaining after the operation will not cause trouble.

Kleinburgstrasse 15.

ORTHOPTIC TRAINING AND SURGERY IN HYPERPHORIA AND HYPERTROPIA COMBINED WITH LATERAL DEVIATIONS

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The indications and contraindications for orthoptic training and surgery, the methods used by various authors and the preferences of these authors for the operative correction of hyperphoria and hypertropia combined with lateral deviations are considered. Attention is directed to the pessimistic statements in the literature concerning the possibility of establishing binocular vision in heterotropia, especially in hypertropia.

Results of preoperative and postoperative orthoptic training measures are tabulated. Excellent results were obtained, especially in private patients who were trained for long periods preoperatively and postoperatively. Only a small percentage of clinic patients observed and trained from one to eighteen months obtained satisfactory binocular vision. The results in alternating strabismus were encouraging. From the Orthoptic Training Department of the New York Eye and Ear Infirmary. This study was aided by a grant from the Ophthalmological Foundation, Inc. Read before the American Ophthalmological Society, Lucerne, Canada, July 9-11, 1934.

The pessimistic statements[1, 2] in the literature concerning the possibility of establishing binocular vision in heterotropia, especially in hypertropia, as contrasted with Guibor's[3, 4], Jackson's[5], Pugh's[6] and our experience[7] with patients who received orthoptic training before and after operation, stimulated us to analyze the results of combined orthoptic and surgical treatment, of a group of patients with hyperphoria and hypertropia combined with lateral deviations.

Examination and Diagnosis

The first step is the accurate determination of visual acuity in each eye separately with and without correction. The second step is the measurement of the angle of deviation for both distance and near by means of the screen and parallax test, and, if possible, with the Maddox rod and screen test[8]. The deviation should be measured with and without correcting lenses and vertical prisms, also under atropine cycloplegia. Whether the lateral deviation is due to an anomaly of divergence or convergence or a combination of both and, if so, which is primary, is important in selecting the operative procedure to be used. The third step is the exclusion of all possible underlying causes; for example, chronic sinus disease and syphilis.

An accurate diagnosis of the muscle or muscles affected is also essential. Careful measurement and observation of the vertical deviation in six fields at 33 cm., and especially in the "four corners" with eyes forcibly turned upward and downward to the right and left, noting the effect of correcting the vertical deviation, are most important. The lateral deviation should be corrected in determining the vertical deviation. The Maddox rod and screen test is of value in certain cases. When diplopia can be appreciated with a red glass or with a fusion spectacle[9] and true projection is present, approximation of the images with prisms is a valuable additional test. These measurements, in association with studies of the fields of monocular fixation, near point of convergence (relative or absolute), the rotations of the eyes (combined and each eye fixing), and determination of the muscle balance for distance and near will usually indicate the muscle or muscles affected. After the paralysis has existed for some time, the secondary spasm of the associated muscles adds difficulty to the diagnosis.

The differential diagnosis of hyperkinesis and hypokinesis of individual muscles. It may seem easy to determine that one muscle is overacting, for the spasm should be detected by an increase in the field of monocular fixation, but this test is unreliable. Paresis resulting in underaction should be detected easily by a contraction in the field of monocular fixation in the area corresponding to the action of the affected muscle. However, unless the spasm is marked or the paresis is great, it is frequently difficult to determine whether the associated antagonist in the other eye is overacting or whether there is a weakness of one of the muscles. This is true especially when the underaction of the affected muscle is so slight that it is an insufficiency rather than a paralysis. The differential diagnosis is difficult even before secondary spasms and other changes have increased the difficulty by changing the deviation to a comitant condition.

The points of similarity and dissimilarity are as follows: In both hypokinesis and hyperkinesis the movement of one eye is more rapid and more extended than that of the other when the eyes are turned into a certain field. The subjective symptoms, false projection and diplopia, increase progressively in the field of action of the affected muscle both in paralysis and spasm of the ocular muscles. However, in hypokinesis, the eye which moves more rapidly usually maintains fixation, whereas in hyperkinesis, the eye which moves more slowly usually fixes. The deviation tends to be constant and to increase slowly if an elevator or depressor underacts, but if spasm causes the hyperphoria, the deviation may increase and decrease rapidly and markedly. In hyperphoria due to paresis, the field of fixation and rotation of the more rapidly moving eye is normal, but limitation is noted in the other eye. In hyperphoria due to spasm, the field of fixation and rotation is larger than normal in the more rapidly moving eye but normal in the other eye.

Refraction. Refractive errors should be carefully corrected under cycloplegia; in children the error of refraction should be determined by means of atropine. After the lenses have been worn for a few weeks, the visual acuity is again determined and the deviation of the visual axes is ascertained as at the first examination. Aniseikonia greater than 0.50 to 0.75 percent may possibly require correction with size lenses.

Preoperative Orthoptic Treatment

Assuming that visual acuity is at its maximum in both eyes, the patient (wearing his lenses) is placed before the orthoptoscope, synoptiscope, or synoptophore, and proper adjustments are made to align the images of the first of the series of diagnostic charts or slides.

The procedure is as follows: Slides with a central point marked for fixation before each eye are placed in one of the instruments; the deviation is measured either by flashing the lights alternately or by shifting a screen from eye to eye, directing the patient to fix the central dot on the slide, changing the angle of the arms of the instrument until the motion has been stopped. This adjustment is made for the vertical as well as for the horizontal deviation. When the amount of the vertical and lateral deviation has been noted on the scale of the instrument, the next step is to determine whether false projection has developed. The patient is asked whether he fuses similar pictures with control marks or superimposes dissimilar pictures, with the arms of the instrument set at the position found by screening. If he does, there is probably no false projection. If the pictures are not superimposed or fused in the position found by the screen test, the patient is asked to adjust the angle of the arms of the instrument until he obtains superimposition or fusion. With the instrument set at this position the observer again performs the screen test. If there is no movement of the eyes, probably there is no false projection, but if there is a movement of the eyes, it is likely that fixed false projection is present. If there is no false projection, the degree of binocular vision is determined according to

Worth's[10] classification, by slides especially designed for this purpose. If there is stereopsis with the special depth slides, a certain degree of third-grade binocular vision probably exists. This should be checked with a 6 M. stereoscope[11], preferably a recording model[12].

Monocular deviation. In patients with poor vision and false projection in one eye, the true macular area may be stimulated by a flashing apparatus attached to the orthoptoscope. Stimulation of the macula must be augmented by occluding the better eye or by using a cycloplegic in this eye between treatments. If true fixation is attained at the end of two or three months, and vision has improved, regular exercises may be continued by using slides corresponding to the degree of vision attained. If the patient is able to superimpose the images, the arms of the instrument are adjusted to develop some amplitude of fusion, if possible. In the meantime, exercises with a stereoscope and drawing pads may be prescribed for home use, provided the patient has developed a fair degree of amplitude of fusion and has carried out the training to be used at home under the supervision of the ophthalmologist. If there is suppression, occlusion may be continued or visual acuity in the better eye may be partially reduced by several methods of decreasing the transparency of the lenses.

If patients have approximately the same degree of vision in both eyes, binocular visual acuity is determined and a series of slides, corresponding to that group, is used to stimulate amplitude of fusion and stereopsis. Exercises for home use may also be prescribed, but progress should be checked by the ophthalmologist at appropriate intervals.

Alternating strabismus. When alternating strabismus is present, the eyes are covered alternately, for periods varying from four days to a week. When the patient will not cover the eye, hyoscine may be used in the eyes alternately but the efficacy of this form of treatment has not been determined. In these cases operation should be performed early, and the eyes occluded alternately until the day of operation, except during exercise periods when attempts are being made to stimulate unification of vision under supervision.

We realize that there is excellent authority for the contention that no fusion sense exists in a patient with alternating strabismus. Our impression is that because excellent vision exists in each eye in the presence of a deviation which does not permit unification of the images, the patient is required to suppress more completely than when visual acuity is low in one eye only. The principal difference between alternating strabismus and the more common type of esotropia or exotropia encountered is that suppression is practiced subconsciously by each eye. It is a well-known fact that in some cases of monocular esotropia or exotropia the squint can be transferred to the other eye if occlusion is sufficiently prolonged[13]. There is no doubt that alternating heterotropia, especially that developing in the first year of life, is the most difficult type to treat orthoptically, and in certain cases the fusion sense may not exist; however, we are inclined to believe that improved methods of treatment and good cooperation on the part of patients will greatly diminish the number of cases in which it is considered impossible to develop unified vision and a certain degree of amplitude of fusion. The degree of stereopsis obtainable in these patients is an important point which requires careful investigation. Fixed false projection is difficult to overcome in these cases and is observed more frequently than is suppression.

We agree with Pugh[6], who directs the Orthoptic Training Clinic at the Royal London Ophthalmic Hospital, that full stereoscopic vision can be developed, but that it requires a longer training period in alternating squints than in monocular squints. Jackson[5], of the Royal Westminster Ophthalmic Hospital Orthoptic Training Department, reports that full stereopsis is obtained in 59 percent of all cases of alter-

nating strabismus, fusion in only 25 percent and no binocluar vision in 16 percent.

Vertical and lateral deviations. For vertical and lateral deviations or tendencies to deviate, prisms in the lenses may be tried to correct part or all of the vertical deviation. After sufficient training with the orthoptoscope or a similar instrument, stereoscopes which permit correction of vertical errors may be used with the Keystone split cards, the Sattler cards, or Kroll charts cut in half, or the new Keystone charts for younger children*. The Hamblin series of convergent and divergent charts is also valuable but not so well adapted for training if the vertical deviation is marked.

After several periods of instruction the patient may use diverging or converging prism exercises[14, 7] at home. When it is impossible to use prisms, he may begin with recession or advancement exercises with a red glass and a small light. As the ability to fuse increases, he may be taught to use prisms. Abducting or adducting exercises are also prescribed for patients who have limitation of abduction or adduction combined with the vertical deviation. Orthoptic training should be continued as long as definite favorable results are being obtained, but operation should not be delayed in patients with high degrees of deviation who have second-grade binocular vision and show no improvement under treatment. Many unfavorable postoperative results may be obviated if second-grade binocular vision with fair amplitude of fusion has been developed before operation.

Contraindications for Operation

Several definite contraindications for operation may be enumerated: (1) If low vertical errors, i.e., under 10 prism diopters, are not improved by wearing prisms or frosted lenses or by means of orthoptic training, we are skeptical of the results to be obtained by operation, especially when patients have few complaints or are free of symptoms. (2) If first-grade binocular vision is present, but second-grade binocular vision (Worth[10] classification) cannot be developed, annoying diplopia may follow the operation. (3) When the hyperphoria varies greatly as the result of activity of the underlying cause, or possibly may improve after treatment. (4) In cases of hyperphoria caused by trauma operation should not be considered for at least one year after the injury, or so long as improvement continues. (5) When amblyopia exists and when marked suppression and false projection have developed, every effort should be made before operating to improve the function of the amblyopic eye, to overcome suppression, and to develop the macula. This may be accomplished most effectively by partial or complete occlusion followed by supervised exercises with the Pugh orthoptoscope or one of the other amblyoscope types of the stereoscope. (6) In high degrees of convergent strabismus, correction of the vertical deviation usually should not be made until the lateral deviation has been partly corrected, unless the hypertropia is over 6 prism diopters or correction of hypertropia with prisms causes reduction in the amount of the lateral deviation. It is our experience that surgical intervention to correct the lateral deviation, combined with subsequent fusion training, will often permit the remaining hypertropia to be overcome.

Indications for Operation

Operation is indicated: (1) if the deviation is so great that optic and orthoptic measures will not correct the condition; (2) if the symptoms are relieved only partially by lenses and prisms, or if lenses should not be worn for cosmetic reasons or other reasons; (3) if the underlying causes have been removed and the condition is stationary.

Operations for Paralyses of Individual Muscles

As Howe[2] has pointed out, practically all the operations practiced on the

* Stepping Stones to Binocular Vision.

medial and lateral recti may be applied to the elevator and depressor muscles. If a vertically acting muscle is paralyzed, one of the following operations may be selected, or several procedures may have to be combined in high primary and secondary deviations.

To increase the action of the weakened muscle there is a choice of: (1) resection; (2) advancement; (3) tucking; or (4) the O'Connor[15] cinch operation. Resection of the superior rectus or advancement of the superior oblique for paralyses of these muscles are operations which illustrate two of these four procedures.

To decrease the action of the associated muscle of the other eye the following measures may be employed: (1) retroplacement[16]; (2) recession[17, 18]; (3) tenotomy (especially the O'Connor[15] two-stage operation); (4) myotomy; (5) lengthening. Myotomy or myectomy of the inferior rectus of the left eye for paralysis of the superior rectus of the right eye illustrates this group of operations.

The action of the direct antagonist in the eye with the paralysis of the muscle may be decreased by: (1) retroplacement; (2) recession; (3) tenotomy (especially the O'Connor two-stage operation); (4) myotomy; (5) lengthening. Tenotomy of the inferior oblique of the left eye for paralysis of the superior oblique of the left eye illustrates this procedure.

The action of the antagonist of the other eye may be increased by: (1) resection; (2) advancement; (3) tucking; (4) the O'Connor cinch operation. Advancement of the right lateral rectus for paralysis of the left lateral rectus may be cited as an example of this surgical principle.

It has been found more satisfactory to strengthen a depressor than to weaken it whenever this procedure has been feasible.

Operations advised by various authors for paralyses of the elevator and depressor muscles. The operations recently advised by various authors for paralyses of the elevator and depressor muscles are as follows: for the superior rectus: tenotomy of the inferior oblique of the opposite eye[19, 20, 21, 22, 23], graduated tenotomy of the inferior oblique of the opposite eye[24]; for the inferior rectus: resection of the paralyzed muscle[19, 22], advancement of the inferior rectus[25]; for the superior oblique: tenotomy of the inferior oblique of the same eye[19, 22], tenotomy of the inferior rectus of the opposite eye[19, 20, 21, 26, 27], recession of the inferior rectus of the opposite eye[20, 21, 22]; for the inferior oblique: tenotomy of the superior rectus of the opposite eye[19, 22, 27].

Operations advised or rejected by other authors. Tenotomy of the superior oblique, originally suggested by Boyer[28], was rejected by him later as inadvisable. Section of the superior-oblique pulley was used by Gairal[28]. The conjunctival approach for tenotomy of the inferior oblique was first advocated by Boyer[28] who also recommended partial tenotomy of the superior rectus for hypertropia[28]. Calder[29] in 1841 did not approve of tenotomy of the superior and inferior oblique muscles because the rotations of monkeys' eyes were not affected. Tenotomy of the right superior rectus for paralysis of the left inferior oblique was suggested by Sachs[30]. In congenital paralysis of the superior rectus Todd[31] combined tenotomy of the inferior oblique of the other eye with tucking of the paralyzed superior rectus and suggested that the tucking operation might well be performed first.

Our choice of surgical technic and the muscle to be operated upon. In paralysis of the superior rectus when the error is low (under 4 prism diopters by the screen and parallax test), we advise lengthening or intracapsular resection[21] of the inferior oblique of the opposite eye. If the error is high (from 4 to 10 prism diopters), myotomy of the inferior oblique may properly be performed. If the error is over 10 prism diopters, myectomy of the inferior oblique is advisable and may have to be followed by resection of the superior rectus.

If the inferior rectus is paralyzed, resection of the paralyzed muscle is preferred, although guarded retroplacement of the superior oblique of the

other eye may also be required. In operations on the inferior rectus and inferior oblique it is well to remember that these muscles are joined by bands of connective tissue and that surgical intervention on either of these muscles may disturb the function of the other muscle.

If the superior oblique is affected, tenotomy or lengthening of the inferior oblique of the same eye or retroplacement of the opposite inferior rectus is advisable, or the superior oblique may be advanced[32].

In paralysis of the inferior oblique, retroplacement of the superior rectus of the opposite eye may be performed, possibly combining this with advancement of the inferior oblique.

Postoperative Orthoptic Training

As soon as the eyes may be opened with comfort orthoptic training is begun, usually a week or ten days after operation. In alternating strabismus and suppression, one eye should be occluded constantly after operation, except when orthoptic training is being carried out. The patient should receive orthoptic training under supervision every day until it is advisable to prescribe exercises to use at home. The orthoptoscope, synoptiscope, or synoptophore is used in the attempt to develop fusion and finally stereopsis with amplitude of fusion. At first it is important not to strain the eyes, and the exercises are limited to the development of fusion by means of simple charts.

If the squint is monocular, and there is suppression, the fixing eye is occluded until appreciation of diplopia is developed. At times we permit fair visual acuity in the better eye by painting the lens with a varnish, so that the vision is equal to or slightly less than that in the poorer eye. If there is suppression with similar objects but diplopia is appreciated with dissimilar objects, one lens may be painted lightly with red or green varnish (Pugh). If alternating strabismus exists, the eyes are covered alternately until diplopia can be appreciated and amplitude of fusion is obtained. When patients have fusion at 6 meters but suppression at 25 cm., the fixing eye is occluded only for close work.

If the vertical deviation is not greater than 12 to 14 prism diopters, an attempt is made to correct it with a prism in a clip-on frame or incorporated in the patient's lenses. Ten to fourteen prism diopters may be divided between the eyes. If laterally placed prisms in the lenses permit fusion, they are sometimes prescribed, their strength being decreased as rapidly as possible as amplitude of fusion increases.

In some cases of convergent strabismus stronger lenses are frequently prescribed for all near work and often permit fusion in near vision.

Exercises are prescribed for home use with the model of stereoscope best suited to the patient, and with the set of cards most interesting and of most benefit for the condition under correction. Exercises with a red glass and candle, either by recession or advancement, are suggested for maintaining fusion.

After fusion at 6 meters and 25 cm. has been established, prisms for developing amplitude of fusion are prescribed. First-, second- and third-grade binocular vision should be stimulated consecutively. Stereopsis is developed by the use of special cards and transparent slides.

In certain cases, especially those in which secondary spasm has not been counteracted and second-grade binocular vision has not been developed by preoperative orthoptic training, fixed false projection may cause the entire deviation to recur because the patient will endeavor to unify the images on the area of the retina used before the operation, and to do this the eyes must deviate approximately as they did before operation.

Classification of Patients

Of 55 patients examined before operation, 45 were classified as heterotropia and 10 as heterophoria*. The age

* Included in the 10 cases of heterophoria are 3 cases of heteroptropia at 6 M. and het-

varied from 2 years to 67 years; 10 were 5 years or under; 45 were over 5 years. The vertical deviation varied from ½Δ to 25Δ as measured for distance by the screen and parallax test in the primary position.

Of the 45 patients with heterotropia, 44 had vertical deviation combined with lateral deviation and 1 had hypertropia only; 9 (20 percent) were amblyopic (visual acuity 20/70 or less); 15 (33 percent) were alternating; 30 (67 percent) were monocular; 36 (80 percent) were convergent; 8 (18 percent) were divergent.

jects observed to be superimposed. Of the 31 (69 percent) patients who fused after operation, the majority [17 (55 percent)] fused for distance and near with the screen test and were converted to heterophoria with good prism divergence and convergence. The approximate increase in fusion after operation, combined with orthoptic training, was 40 percent.

Table 1

FUSION RESULTS IN 45 CASES OF HETEROTROPIA

	Before Operation		After Operation	
Fusion with screen test		2 (4%)		21 (48%)
Distance and near			17	
Near	2		3	
Distance			1	
Fusion with stereoscope		2 (4%)		2 (4%)
Fusion with Worth amblyoscope		2 (4%)		
Fusion with orthoptoscope				2 (4%)
Fusion with red and white lights with prisms		2 (4%)		4 (9%)
Fusion with stereoscope and red and white lights with prisms		4 (9%)		2 (4%)
No fusion		32 (73%)		14 (31%)
Amblyopic	9		6	
Age 2	1			
No record of ability to fuse		1 (2%)		
		45 (100%)		45 (100%)

Results of Operative and Orthoptic Treatment

The fusion (a mental process which combines the two retinal images into a single visual impression) obtained in 45 patients with heterotropia is shown in table 1.

Discussion of table 1. Excluding the six amblyopic patients, some degree of fusion was obtained after operation in all except eight patients (18 percent).

The twelve patients (27 percent) who fused before operation, fused with the aid of prisms or devices such as the amblyoscope, which permitted the observation of the eyes in the primary position.

In table 2 the study of the 17 patients (see table 1), who fused for distance and near after operation, is continued. The type of operation, and the muscle findings before and after operation are recorded.

An extensive myectomy of the left inferior oblique in a patient (table 2, no. 2) who had 8Δ of left hypertropia for distance and 10Δ for near, possibly associated with weakness of the right superior rectus with a high degree of esotropia, resulted finally in the reversal of the hypertropia to right hyperphoria of 10Δ.

We are now much more conservative in operating on vertical deviations associated with high degrees of lateral deviation. We have also become extremely conservative in performing retroplacement on one of the vertically acting muscles until orthoptic training has been used for a long time preoperatively, because a 2-mm. retroplacement of the left superior rectus in one pa-

erophoria at 25 cm.; 1 case of heterotropia at 25 cm. and heterophoria at 6 M. The remaining 6 were cases of heterophoria at 6 M. and 25 cm.

Table 2

MUSCLE FINDINGS AND OPERATIONS PERFORMED ON 17 PATIENTS WHO HAD FUSION WITH SCREEN TEST FOR DISTANCE AND NEAR

Case No.	Muscle Findings Before Operation	Operation	Muscle Findings After Operation and Orthoptic Training
1* Age: 3½ yrs.	sc LHt 20–25; LHt′ 22;	Tenotomy and myectomy of left inferior oblique (5 mm.).	E 0, RH 0; D 5, C 20; D′ 8, C′ 35.
2* (1) Age: 19 yrs. (2)	Et 65, LHt 8; Et′ 82, LHt′ 10. Et 65, RHt 4; Et′ 85, RHt′ 6.	Myectomy (12 mm.) of left inferior oblique. Resection of left lateral rectus; tendon lengthening of left medial rectus.	sc RH 2, E 6; E′ 6, RH′ 10. Binocular single vision at 6 M., but diplopia with red glass 6 M.
3 Age: 14 yrs.	sc Et 80, RHt 4; Et′ 95, RHt′ 4. Fuses red and white lights with prisms.	Bilateral retroplacement: R. E. 4.5 mm.; L.E. 5 mm.	cc E 3; E′ 4; D 6; D′ 45.
4* Age: 10½ yrs.	Et 60, LHt 5; Et′ 65, LHt′ 5	Bilateral retroplacement of medial recti (4.25 mm.).	Screen and parallax: 0, 0′; Maddox rod: LH 1; LH′ 1; D 12(?), C 35; D′ 8, C′ 35. 7$^{\Delta}$ vertical prism in lens.
5 Age: 67 yrs.	cc Xt 20, RHt 8; Xt′ 40, RHt′ 4. Fusion at times.	R. E. retroplacement of lateral rectus (3.5 mm.).	X 3, RH 2; RH′ 3, 0′. D 8, C 20; D′ 10, C′ 50.
6 Age: 26 yrs.	sc Et 50, LHt 4; Et′ 60, LHt′ 4.	O. U. retroplacement of medial recti (4 mm.).	Maddox rod: E 2; 0′; D 8, C 10; D′ 5, C′ 8.
7* (1) Age: 20 yrs. (2)	sc Et 50, RHt 3; Et′ 55, RHt′ 3½. Et 65, RHt 4; cc Et 30.	Bilateral retroplacement of medial recti, R. 3½ mm. raised ½ mm., L. 5 mm. Resection of both lateral recti (6 mm.).	Maddox rod: 0, 0′, RH′ 0; Screen and parallax: RH 2; X′ 10; D 6, C 30; D′ 20, C′ 25.
8 (1) Age: 2 yrs. (2)	Et 12, LHt 12; Et′ 35, LHt′ 12. Et 20, LHt 50.	Myotomy of left inferior oblique. Resection of left inferior rectus (5 mm.); R. E. retroplacement of medial rectus (2 mm.).	sc Et 8, LHt 6; Et′ 8, LHt′ 5 (with a 9$^{\Delta}$ vertical prism in lenses fuses with screen test at 6 M. and 25 cm.).
9 Age: 6 yrs.	Et 60; Et′ 60+; No fusion.	Bilateral retroplacement of medial recti (4 mm.).	E 3; E′ 5, RH′ 1; D 1, D′ 3.
10* Age: 25 yrs.	cc Xt 42, LHt 6; sc Xt′ 50.	Bilateral retroplacement of lateral recti (4.5 mm.).	X 25, LH 1–0; X′ 12. sc D 15, C 8; D′ 15, C′ 25.
11* (1) Age: 9½ yrs. (2) (3)	Et 25, RHt 3½; Et′ 35, RHt′ 3½. Fuses red and white lights with prisms at 25 cm. Et 30, RHt 1–3; Et′ 30, RHt′ 4. Et 33, LHt 3; Et′ 30, LHt′ 3.	Myectomy of right inferior oblique. Bilateral retroplacement of lateral recti and myotomy of right inferior oblique. Retroplacement of right medial rectus.	sc E 3; 0′; D 3, C 35; D′ 15, C′ 50.

Table 2 (Continued)

MUSCLE FINDINGS AND OPERATIONS PERFORMED ON 17 PATIENTS WHO HAD FUSION WITH SCREEN TEST FOR DISTANCE AND NEAR

Case No.	Muscle Findings Before Operation	Operation	Muscle Findings After Operation and Orthoptic Training
12* (1) Age: 4 yrs.	Et 80; Et′ 90, LHt′ 10.	Myotomy of left inferior oblique; Reese resection of left lateral rectus and retroplacement of left medial rectus.	E 5; E′ 8, D 6, D′ 6.
(2)	cc Et 20; RHt 15; Et′ 35, RHt′ 15.	Myotomy of right inferior oblique and retroplacement of right medial rectus.	
13* Age: 11½ yrs.	cc Et 25, RHt 3; Et′ 30, RHt′ 2.	L. E., retroplacement of medial rectus (3.5 mm.).	cc E 10; E′ 15; D 4, D′ 4.
14* Age: 5 yrs.	sc Et 50, LHt 3; Et′ 65, LHt′ 4.	Bilateral retroplacement of medial recti (3 mm.).	Screen and parallax: sc E 10; E′ 10; cc. D 8, D′ 15.
15* (1) Age: 21 yrs.	Xt 20, LHt 7; Xt′ 60, LHt′ 7. Fusion at times with prisms.	Right lateral rectus (which had been tenotomized) receded 12.5 mm. from cornea, 5.5 mm. from old insertion.	cc E 6; E′ 4; (LH 7–8$^{\Delta}$, apparently corrected by 6$^{\Delta}$ prism).
(2)	cc Xt 20, Xt′ 40; Some fusion with stereoscope.	Resection of right medial rectus; retroplacement of left lateral rectus (6 mm).	
16* Age: 11 yrs.	Xt 4, RHt 20; Xt′ 8, RHt′ 18.	Myotomy of right inferior oblique.	Maddox rod: 0; 0′; Orthoptoscope: D 15, C 12.
17* (1) Age: 5½ yrs.	Et 65, LHt 6, Et′ 65, LHt′ 6. sc or cc.	Bilateral retroplacement of right medial rectus (4 mm.) and left (4 mm.)	sc E 15, LH 3; E′ 6; LH′4, D 10, D′ 30.
(2)	cc Et 25; Et′ 20.	Resection of lateral recti.	

Key to Table 2.—
* Alternating cases.
Prism diopters measured by screen and parallax test.
(1), (2), (3) first, second, and third operations, respectively.
X, exophoria at 6 M.; E, esophoria at 6 M.; RH, right hyperphoria at 6 M.; LH, left hyperphoria at 6 M.; Xt, exotropia at 6 M.; Et, esotropia at 6 M.; RHt, right hypertropia at 6 M.; LHt, left hypertropia at 6 M.; prime mark (′), near; sc, without correction; cc, with correction; D, divergence; C, convergence.

tient resulted in overcorrection of the left hypertropia by 14$^{\Delta}$. The patient had a left hypertropia of 15$^{\Delta}$ and this was changed to a right hypertropia of 14$^{\Delta}$.

The degree of stereopsis obtained postoperatively in 17 patients who fused for distance and near with the screen test.—Table 3 records the data in regard to the postoperative stereoscopic ability of 9 patients who were tested for stereopsis.

Of the 17 patients who attained fusion for distance and near (cf. table 1), as shown by the screen test, 9 were tested for stereopsis. Seven of this number were tested by means of the Howard 6-M. stereoscope. Of these 7 cases, 3 were within the average required by the International Visual Standard for stereopsis for aviators. The average readings varied from 13 mm. to 132 mm., without correction, and from 6 mm. to 143 mm., with correction.

A 6-M. stereoscope of the Howard modification of the Brookbank James[33] apparatus, and the Spearman[34] appara-

tus are more valuable than the ordinary hand stereoscopes. We prefer the 6-M. recording stereoscope[12], in which the speed of movement of the test object and the time for making the judgment are controlled and with which there is no opportunity of seesawing the movable object back and forth or of feeling the position of the test object by the distance the hands are moved. All the stereoscopic tests with charts or with lantern slides are more purely subjective and are unreliable, especially for young children. The slides for the orthoptoscope made for us by Hamblin, and the Clement Clarke slides are open to the same objections. Patients who do well with these slides and charts frequently have poor stereopsis when measured with the 6-M. stereoscope.

The fact that a great many countries have adopted the 6-M. stereoscope as a standard for determining stereopsis in aviators possibly suggests the importance of this method of testing.

The stereometric cards* permit the estimation of stereopsis in patients with four degrees of visual acuity; i.e., 20/120, 20/90, 20/50, and 20/25. They record the amount of stereoscopic ability in percent, for example, 110 percent stereopsis, according to an arbitrary standard, is the ability to determine the position of a letter or figure which has been displaced 2/1000 of a millimeter.

Special study of patients with alternating strabismus. Because of the controversial status of the question of the value of orthoptic training in alternating strabismus and the confusion which exists in regard to the presence or absence of a "fusion center," the postoperative results in these cases are shown in table 4. The patients who had alternating strabismus are indicated by asterisks in table 2.

Table 3

RECORD OF STEREOPSIS† OF 9 PATIENTS

Case No.		Howard 6-M. Stereoscope	
		Without Correction	With Correction
1*	Aged 9½ years, sc., some "E" series Wells charts; inaccurate stereopsis		
2*	Aged 4 years, "E" series Wells	132 mm.	143 mm.
3*	Aged 11½ years (vertical and horizontal prisms in lenses)	77 mm.	66 mm.
4	Aged 26 years		70 mm.
5*	Aged 5 years	53 mm.	
6*	Aged 21 years (vertical prism in lenses)		22 mm.
7	Aged 6 years, sc. third-grade vision with some slides on orthoptoscope. Keystone Diagnostic Stereometric cards with 20/120 equals 70 percent		
8*	Aged 11 years	13 mm.	6 mm.
9*	Aged 5½ years	47 mm.	33 mm.

* Patients who had alternating strabismus.

† Normal stereopsis (Department of Commerce) 30 mm. or less without correction[12]; normal stereopsis (International Standard) 50 mm. or less[12].

Discussion of table 4. Patients included in table 4 had equal vision in both eyes and no preference for either eye. Table 3 shows that in three of the alternating cases (cases 6, 8, 9) there was stereoscopic ability (as tested with the Howard 6-M. stereoscope) within the International standard for stereopsis for aviators[38]. Two of these patients (cases 6, 8) had sufficiently accurate stereopsis to pass the rigid United States Department of Commerce test[12]. One patient (case 5, table 3) was within 3 mm. of the International standard.

It may be noted in table 2 (the starred cases) that all but two (cases 2, 15, fusion amplitude not recorded) of

* Keystone View Company.

Table 4

RESULTS IN 15 CASES OF ALTERNATING STRABISMUS

		Total
Age		
5 years or under	3	15 (100%)
Over 5 years	12	
Fusion with screen test (no record of stereopsis)*		5(33%)
Divergent case	1	
Convergent cases	3	
Vertical case (esotropia 3Δ)	1	
Stereopsis (fairly accurate)		7(47%)
Convergent cases (table 3, cases 1, 2, 3, 5, 9)	5	
Divergent cases (table 3, cases 6, 8)	2	
Still alternate (convergent cases)		3 (20%)
		15 (100%)

* Prism convergence and divergence were well developed in all but two of these cases, in which there was no record of convergence and divergence.

the patients with alternating strabismus, who obtained fusion developed good fusion amplitude when tested with prisms.

Results after operation and orthoptic training in 45 cases, classified according to the type of deviation. The heterotropia cases, classified according to the type of anomaly, i.e., vertical, divergent, or convergent, and the results of operation and orthoptic training, are shown in table 5.

In the 45 cases of divergent and convergent heterotropia combined with vertical deviation, fusion was obtained in 31 cases (69 percent); fusion with the screen test was obtained in 12 (27 percent); fusion with red and white lights with prisms in 4 (9 percent); fusion with the stereoscope, 2 (5 percent); fusion with the orthoptoscope in 2 (5 percent); fusion with the stereoscope and red and white lights with prisms in 2 (5 percent); stereopsis recorded (table 3) in 9 (20 percent). Fairly accurate stereopsis was obtained with the Howard 6-M. stereoscope in 7 of these cases (16 percent). No fusion was obtained in 14 (31 percent); 6 (13 percent) of the 45 patients were amblyopic.

Results of combined optic, orthoptic, and surgical treatment of patients with combined vertical and lateral heterophoria. In table 6 the preoperative and postoperative muscle findings and the

Table 5

POSTOPERATIVE RESULTS IN CASES OF VERTICAL DEVIATION COMBINED WITH DIVERGENT AND CONVERGENT HETEROTROPIA

	Vertical Only (1 case)		Divergent (8 cases)		Convergent (36 cases)	
Fusion with screen test (No record of stereopsis)		1 (100%)		3 (37.5%)		8 (24%)
Distance and near	1		2		5	
Near			1		2	
Distance					1	
Fusion with red and white lights with prisms						4 (11%)
Fusion with stereoscope						2 (5%)
Fusion with orthoptoscope						2 (5%)
Fusion with stereoscope and red and white lights with prisms						2 (5%)
Stereopsis						
Recorded with Howard 6-M. stereoscope						
Divergent (table 3, cases 6, 8)				2 (25%)		
Convergent (table 3, cases 2, 3, 4, 5, 9)						5 (14%)
Recorded with other apparatus						
Convergent (table 3, cases 1, 7)						2 (5%)
No fusion				3 (37.5%)		11 (31%)
Amblyopic			2		4	
False projection					3	
		1 (100%)		8 (100%)		36 (100%)

Table 6

MUSCLE FINDINGS AND OPERATIONS PERFORMED IN 10 CASES OF HETEROPHORIA

Case No.	Muscle Findings Before Operation	Operation	Muscle Findings After Operation and Orthoptic Training
1* Age: 7 yrs.	Et 20, RHt 10; E′ 20cc. Fuses on stereoscope and with red and white lights at 6 M. with prisms.	R. E. myectomy of right inferior oblique (4 mm.); retroplacement of right medial rectus (5 mm.).	Fuses red and white lights with prisms.
2† Age: 30 yrs.	RH 3; RH′ 3; D 9, C 10; D′ 11, C′ 24.	Myotomy of right inferior oblique.	RH 1, D 10, C 18.
3† Age: ?	E 5–6, RH 3–5; E′ 6, RH′ 4.5. D 7, C 14; D′ 10, C′ 13.	Myotomy of right inferior oblique.	RH 3, D 7, C 18.
4 Age: 14 yrs.	X 16, RH ½; X′ 3 cc. D 20, C 14; D′ 12, C′ 40.	R. E. retroplacement of right lateral rectus (3 mm.).	X 8, RH 1; E′ 3. C 110; C′ 110.
5 Age: 30 yrs.	X 8, RH 1½; X′ 18. D 8, C 6; D′ 20, C′ 8.	R.E. retroplacement of right lateral rectus (1½ mm.).	Screen and parallax: X 6; Maddox rod: E 8; O′; D 6, C 25; D′ 12, C′ 46.
6 Age: 51 yrs.	cc LH 3; LH′ 2; D 7, C 5; D′ 7, C′ 13.	Myectomy of left inferior oblique.	O, E′ 4 cc. Fuses red glass with prisms.
7 Age: 6 yrs.	Xt 30, LHt 20; X′ 15, LH′ 4. D′ 40, C′ 2.	Myectomy, through conjunctiva, of left inferior oblique (10 mm.); retroplacement of left lateral rectus (7 mm.).	Xt 12, LHt 6; X′ 13, LH′ 3. Fuses Kroll charts.
8* Age: 36 yrs.	Xt 12, LHt 3; X′ 30, LH′ 3. D′ 25, C′ 15.	Retroplacement of left lateral rectus (5 mm.); stretching of superior rectus.	X 10, LH 3; X′ 15, LH′ 3; C 80.
9 Age: 4 yrs.	E 15; Et′ 20, LHt′ 4.	L. E. myotomy of inferior oblique.	cc E 6; O′; D 4, C 12; D′ 15, C′ 10 (Prisms in lenses).
10 Age: 30 yrs.	X 5, LH 18; LH′ 4; D 6, C 15; D′ 6, C′ 4.	Myectomy of left inferior oblique (5 mm.).	O; X′ 10, LH′ 3; D 4, C 13; D′ 12, C′ 15.

Key to Table 6.—

* Alternating cases,

† Aviators disqualified because hyperphoria was more than 1$^{\Delta}$ (United States Department of Commerce Standard).

X, exophoria at 6 M.; E, esophoria at 6 M.; RH, right hyperphoria at 6 M.; LH, left hyperphoria at 6 M.; Xt, exotropia at 6 M.; Et, esotropia at 6 M.; RHt, right hypertropia at 6 M.; LHt, left hypertropia at 6 M.; prime mark (′), near; sc, without correction; cc, with correction; D, divergence; C, convergence.

operations performed on 10 patients with heterophoria are tabulated.

Discussion of table 6.—We have always contended that the most important field for orthoptic training is in the treatment of patients with heterophoria. The increased amplitude of fusion obtained following operation and orthoptic training is of interest and seems to be an important factor in the relief of symptoms.

There were 10 cases of heterophoria. Included in the 10 are 3 cases of heterotropia at 6 M. and heterophoria at 25 cm., one case of heterotropia at 25 cm. and heterophoria at 6 M. The remaining 6 cases were of heterophoria at 6 M. and 25 cm. The age varied from 4 to 51 years. Two patients (no. 2, 3) were aviators, disqualified because of vertical deviation. Four patients complained of headaches and asthenopia

and were apparently relieved by the combined treatment.

One or two of our patients apparently developed more hyperphoria following the operation than they had before operation, notably as in case 4, table 6. This may be due in certain cases to placing the muscle too high or too low in retroplacement or recession, but undoubtedly in some cases the disturbance of equilibrium following operation made it more difficult for the patients to overcome their hyperphoria by neuromuscular action.

Is Postoperative Fusion Dependent Upon Preoperative and Postoperative Orthoptic Training?

The statement, so often made, that patients who obtain fusion after operation when orthoptic training is carried out, would obtain fusion if no training were given, is undoubtedly true in certain cases. However, we believe that, without orthoptic training, few patients reported in our series would have developed the amplitude of fusion and stereopsis which they obtained. We are convinced that fusion would have been highly improbable without preoperative and postoperative orthoptic training in the patient whose history is recorded (Case 1).

Case 1.—Miss N. B., aged 5½ years, was first seen Jan. 23, 1929. The vision was 20/15 in each eye. Diagnosis: alternating esotropia with hypertropia. There was esotropia of 65$^{\Delta}$ with left hypertropia of 6$^{\Delta}$ for distance and near. Under atropine cycloplegia she accepted +1.25 sphere. This correction was prescribed for both eyes. Diverging exercises by recession and stereoscopic exercises with Kroll charts were prescribed. The angle of deviation was not materially improved at the end of 5 months, and a 4-mm. retroplacement of both medial recti was performed. Two weeks after operation she had esotropia of 10$^{\Delta}$ for distance and 20$^{\Delta}$ for near. Exercises were continued and at the end of one year she had esotropia of 25$^{\Delta}$ for distance and 20$^{\Delta}$ for near with correction. Resection of both lateral recti was performed and one month later she had esophoria of 10$^{\Delta}$, left hyperphoria 4$^{\Delta}$ for distance; esophoria of 12$^{\Delta}$ and left hyperphoria 6$^{\Delta}$ for near without correction. The exercises were continued with Wells charts, bar reading and diverging exercises with prisms. At the end of two months she attained a diverging power of 10$^{\Delta}$ for distance and near. Her last examination, June, 1934, revealed third-grade binocular vision with wide amplitude of fusion as tested on the orthoptoscope (divergence 15$^{\Delta}$). Her average reading on the Howard 6-M. stereoscope was 47 mm. without correction. The final measurements without correction were: at 6 M. esophoria 10$^{\Delta}$, left hyperphoria 3$^{\Delta}$; at 25 cm. esophoria 12$^{\Delta}$. Prism divergence was 12$^{\Delta}$ for distance and 25$^{\Delta}$ for near.

In spite of a vertical and lateral deviation and without correcting prisms this patient postoperatively obtained an average depth perception of 47 mm. with the Howard 6-M. stereoscope. She was given orthoptic training by a nurse trained in orthoptic treatment who went to her home for two months after each operation.

The value of orthoptic training is also shown in a study of results following retroplacement[7]. One of us (C. B.) reported fusion in 18 (50 percent) of 36 private patients and good stereoscopic vision in 13 (36 percent); two (11 percent) of the 18 clinic patients fused but none had stereoscopic vision. The results with private patients were exceptionally good because 14 (39 percent) had one amblyopic eye (vision 20/70 or less). Orthoptic training in our clinics presents many difficulties because of crowding, the time and expense of preoperative and postoperative training, the inadequacy of the followup work[36], and poor cooperation at home.

Another reason why we cannot agree with the statements that orthoptic training is of no value in heterotropia is because a group of patients, examined in the Orthoptic Training Department of the New York Eye and Infirmary, obtained binocular vision in no degree comparable with that obtained in the series of patients we trained preoperatively and postoperatively, even though only a small proportion of them had vertical deviation. The report follows:

Examination of 43 patients*, who had had neither preoperative nor postoperative orthoptic training before they were examined in the Orthoptic Training Department of the New York Eye and

* Statistics shown here and in table 7 obtained through the courtesy of Dr. J. S. Cregar and Miss E. C. Mueser.

Ear Infirmary, showed that at the time of the first examination one patient had developed heterophoria postoperatively without orthoptic training.

Thirty-seven (86 percent) of the 43 patients subsequently received orthoptic training postoperatively. After training from 1 month to 18 months, 4 (11 percent) of the 37 developed second-grade binocular vision and fused at 6 M. and 25 cm. Two (5.5 percent) fused at 6 M. but not at 25 cm. with the aid of lenses. One (2.7 percent) developed accurate stereopsis on the orthoptoscope with Clement Clarke depth slides; one (2.7 percent) fused at times at 6 M. and 25 cm.; 28 (76 percent) did not fuse at 6 M. or 25 cm. without prisms or some other artificial aid, for example, the orthoptoscope.

Table 7

POSTOPERATIVE RECORD OF PATIENTS WHO DID NOT FUSE WITH LENSES ONLY

	Number of Cases
Fixed false projection	5 (17.8%)
Amblyopia	3 (10.7%)
Complete suppression	4 (14.3%)
Appreciation of diplopia but no superimposition	7 (25%)
First-grade binocular vision	2 (7.1%)
Second-grade binocular vision	4 (14.3%)
Occasional second-grade binocular vision	1 (3.6%)
Third-grade binocular vision	1 (3.6%)
No record of binocular vision	1 (3.6%)
	28 (100%)

Discussion of table 7. Of the 28 who did not fuse without artificial aid 5 (17.8 percent) had fixed false projection. Three (10.7 percent) of this group were amblyopic. Two (7.1 percent) had first-grade binocular vision. Four (14.3 percent) had good second-grade binocular vision (fusion of similar objects with fair amplitude). One (3.6 percent) had occasional second-grade binocular vision. One (3.6 percent) had third-grade binocular vision. Only 6 (21.4 percent) of the 28 patients fused. Adding the 8 who fused with lenses, 14 (40 percent) of the 37 patients who received orthoptic training postoperatively developed some degree of fusion. Three (10.7 percent) of the 28 patients were amblyopic. Of the total number (43 patients) 6 (14 percent) who had no orthoptic training preoperatively or postoperatively also did not fuse.

Summary

It is evident from the study of our records made in the past that the methods of evaluating binocular vision, especially stereopsis, require reconsideration; also that our methods of examination and of recording data must be systematized. The majority of patients presented in this series were not studied with the Howard 6-M. stereoscope. It is our opinion that this test, although it does not take the time factor into consideration, nor the speed of movement of the test object, and is not so accurate nor so difficult as the test with the 6-M. recording stereoscope, is at least partly objective. It is probably a more accurate measure of stereopsis than tests with the usual hand stereoscopes and charts or even with the orthoptoscope type of stereoscopes with transparent slides.

The records of patients who fused either at 6 M. or 25 cm. but who had heterotropia either for distance or near were purposely excluded from the records of patients who had heterotropia, because they would naturally have increased the percentage of those who might have been supposed to develop second-grade binocular vision or stereopsis.

It should be noted that 6 patients (preoperatively nine were amblyopic but three apparently improved with training) in the group of 45 patients with heterotropia were amblyopic, i.e., they had 20/70 vision or less, which also materially decreases the number of patients who could presumably develop stereopsis.

Although we believe that accurate stereopsis is important, we believe also that good amplitude of convergence and divergence at 6 M. and 25 cm., and when the patient is accommodating, is of great value in maintaining the eyes

in proper position, both with and sometimes without correcting lenses.

Our final impression is that all the work we have done so far, although it was the best we knew how to do at the time, has been haphazard and that our preliminary and final examinations should be more complete and should include examinations with such accurate apparatus as the orthoptoscope and the 6-M. stereoscope as well as with the clinical tests generally employed. We have developed an elaborate record form and believe that the printed headings will stimulate the keeping of more complete records in clinic and private practice.

We know not only that this work requires much time and patience and that few busy ophthalmologists can give their time to it, but also that temperamentally they are usually unsuited to the work. Our most striking results have been obtained when patients could afford the services of a trained technician who was with them constantly after operation for periods varying from one to three months. One of the most important factors to be considered is the tendency of these patients to relapse, and it is just as essential for them to continue their exercises periodically as it is for the athlete to continue his training. Many of our private patients have received continuous training for three or four years.

Conclusions

1. Apparatus for orthoptic training is valuable, if not indispensable, in the diagnosis and treatment of heterophoria and heterotropia before and after operation; also for contributing valuable information as to the type and extent of operation to be performed.

2. The degree of binocular vision and the amplitude of fusion before operation usually indicate the results which may be obtained from orthoptic training after the eyes are placed in approximate parallelism.

3. If true projection is not developed before operation, the same degree of deviation which existed prior to intervention is likely to recur, especially in those patients whose most spasmodic muscle or muscles were not weakened.

4. A prescription of vertical prisms in lenses partially to correct the hyperphoria or hypertropia tends to diminish the lateral heterophoria or heterotropia, in some cases, as much as five or ten degrees. This was also observed after the surgical correction of vertical deviations.

5. In cases slightly overcorrected or undercorrected by operation, orthoptic training contributed greatly toward the use of both eyes simultaneously. The improvement was especially striking in three patients with alternating strabismus who developed accurate stereopsis (better than 50 mm. with the 6-M. Howard stereoscope).

6. The development of fusion in 31 (69 percent) of 45 patients with heterotropia when 6 (13 percent) of the 45 were amblyopic, we believe to be a higher percentage of fusion than could have been obtained without preoperative and postoperative orthoptic training. Heterotropia for near and distance was changed to heterophoria at 6 M. and 25 cm. in 17 (39 percent) of these cases. Before operation 73 percent could not fuse.

7. Of 43 patients with heterotropia who received no preoperative or postoperative orthoptic training, only 1 (2 percent) developed heterophoria. Thirty-seven (86 percent) of the 43 patients later were given postoperative training from 1 to 18 months: 4 (11 percent) developed second-grade binocular vision and fused at 6 M. and 25 cm.; 4 others (11 percent) developed some degree of fusion; 28 patients could not fuse without artificial means; 6 of these (21.4 percent) had fair fusion; therefore, 14 (40 percent) of the 37 patients who received orthoptic training postoperatively developed some degree of fusion. Three (8 percent) of the thirty-seven were amblyopic.

8. Of 15 cases of alternating strabismus fusion of some degree was obtained in 12 cases (80 percent); in 3 (20 percent) accurate stereopsis developed; in 3 (20 percent) there was inability to fuse; and fair stereopsis was obtained in 4 others (27 percent).

9. Placing the eyes in approximate

parallelism is apparently of great value as an aid to fusion, as there was an increase of 40 percent in the number of patients who fused after operation as compared with the number who fused before operation.

10. When the amount of deviation is so great as to interfere with normal binocular vision at 6 M. and 25 cm. and is not improving with orthoptic treatment, operation should be performed.

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References

[1] Onfray, R. Manuel pratique du strabisme. Paris, G. Steinheil, 1909.

[2] Howe, L. The muscles of the eye. New York and London, G. P. Putnam's Sons, 1908, v. 2, p. 441.

[3] Guibor, G. P. Some possibilities of orthoptic training. Arch. of Ophth., 1934, March, v. 11, p. 433.

[4] ———. The possibilities of orthoptic training. Further report. Trans. Amer. Acad. Ophth., 1933, p. 214.

[5] Jackson, A. S. Personal communication, June 18, 1934.

[6] Pugh, M. A. Personal communication, June 19, 1934.

[7] Berens, C., Losey, R. R., and Stark, E. K. The diagnosis and treatment of non-paralytic strabismus. New York State Jour. Med., 1929, June 1, v. 29, p. 663.

[8] Dolman, P. The Maddox rod screen test. Arch. of Ophth., 1919, v. 48, p. 503.

[9] Berens, C. A test for fusion and a fusion spectacle. Trans. Sect. Ophth., Amer. Med. Assoc., 1934.

[10] Worth, C. Squint: Its causes, pathology and treatment. Ed. 5, London, Baillière, Tindall and Cox, 1921.

[11] Howard H. J. A stereomicrometer—An instrument of precision for measuring stereopsis. A six-meter stereoscope. Trans. Amer. Ophth. Soc., 1919, v. 17, pp. 395 and 401.

[12] Berens, C. Present ophthalmologic standards for commercial aviation in the United States. Jour. Aviation Med., 1932, June, v. 3, p. 55.

[13] Peter, L. C. Amblyopia ex anopsia in adult life. Amer. Jour. Ophth., 1932, June, v. 15, p. 493.

[14] Berens, C., Losey, R. R., and Hardy, L. H. Routine examinations of the ocular muscles and nonoperative treatment. Amer. Jour. Ophth., 1927, December, v. 10, p. 910.

[15] O'Connor, R. Transplantation of ocular muscles. Amer. Jour. Ophth., 1921, v. 4, p. 838.

[16] Berens, C., Losey, R. R., and Connolly, P. T. Retroplacement for strabismus. Amer. Jour. Ophth., 1929, September, v. 12, p. 720.

[17] Curdy, R. J. The operative treatment of squint. Jour. Missouri State Med. Assoc., 1916, v. 13, p. 16.

[18] Jameson, P. C. Principle of muscle recession, Arch. of Ophth., 1925, v. 54, p. 496.

[19] Duane, A. Motor anomalies of the eye. New York, J. H. Vail & Co., 1897.

[20] White, J. W. Hyperphoria. Arch. of Ophth., 1932, May, v. 7, p. 739.

[21] ———. Paralysis of the superior rectus muscle. Trans. Amer. Ophth. Soc., 1933, v. 31, p. 551.

[22] Dunnington, J. H. Hyperphoria, its etiology, diagnosis and treatment. Amer. Jour. Ophth., 1931, November, v. 14, p. 1140.

[23] Axenfeld, T. Kosmetische Immobilisierung des Auges und Tenotomien des Levator palpebrae superioris, nebst Bemerkungen über Operationen an den Obliqui. Arch. f. Ophth., 1921, v. 105, p. 1197.

[24] McCool, J. L. Graduated tenotomy of inferior oblique muscle as an aid in the correction of certain forms of squint. Trans. Amer. Acad. Ophth., 1922, p. 163.

[25] Asmus, E. Ueber weitere mit Augenmuskelvorlagerung gemachte Erfahrungen. Ztschr. f. Augenh., 1922, v. 47, p. 79.

[26] Shumway, W. A. Traumatic paralysis of left superior oblique muscle relieved by tenotomy of the right inferior rectus. Pennsylvania Med. Jour., 1921, June, v. 24, p. 623.

[27] Bannister, J. M. Surgical treatment of comitant and paralytic strabismus. Amer. Jour. Ophth., 1921, v. 4, p. 659.

[28] Boyer, L. A. H. Recherches sur l'opération du strabisme. Paris, Au bureau de la Lancette française, G. Baillière, 1842, pp. 97-100.

[29] Calder, F. W. G. Practical hints on the cure of squinting by operation. London, H. Renshaw, 1841.

[30] Sachs, M. Isolierte Lähmung des Obliquus inferior oculi sinistri (Enophthalmus traumaticus).—Heilung durch Tenotomie des Rectus superior oculi dextri. Beitr. z. Augenh., 1894, v. 2, (book 14), p. 44.

[31] Todd, F. C. Deviation upward of one eye, due to overaction of the inferior oblique, consecutive to congenital paresis (or insufficiency), of the superior rectus of the other eye. Trans. Amer. Acad. Ophth., 1916, p. 172.

[33] Wheeler, J. M. Superior oblique and inferior oblique advancement. Trans. Amer. Ophth. Soc., 1934, and Amer. Jour. Ophth., 1935, January, v. 18, p. 1.
[34] James, G. T. B. On the measurement of the stereoscopic visual acuity. Lancet, 1908, June 20, p. 1763.
[35] Spearman, C. Stereoscopic vision. Amer. Jour. Ophth., 1919, v. 2, p. 432.
[36] Berens, C. International visual standards for aviators. Amer. Jour. Ophth., 1933, v. 16, p. 403.
[37] ———, and Taylor, M. K. Social service and follow-up in ophthalmology. Hosp. Soc. Serv., 1927, v. 16, p. 89; Berens, C. Social service and follow-up in ophthalmology. Conclusions after restudy of hospitals in New York and Brooklyn. Trans. Amer. Acad. Ophth., 1926, p. 226.

GONIOPHOTOGRAPHY

Photography of the Angle of the Anterior Chamber in Living Animals and Human Subjects

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This short account of the procedure in gonioscopy of animal and human eyes does not lend itself to review. The illustrations indicate the degree of success obtainable with this method. From the Institute of Ophthalmology, Columbia Presbyterian Medical Center.

I am indebted to Dr. M. Uribe y Troncoso for his unlimited patience in familiarizing me with the use of the gonioscope for the study of the angle of the anterior chamber in human beings. I wish to express my appreciation for his teachings, and to him I dedicate this modest contribution to the study of the angle in living animals and human subjects.

It is not the purpose of the paper to offer a complete exposition of the topography of the angle of the anterior chamber in both animals and human beings, but merely to describe briefly the technic used in photographing it. Those interested in an exhaustive, detailed description of gonioscopical methods and findings in human eyes are referred to the papers of Koeppe (1920-1922), Salzmann (1915), Trantas (1919), M. Uribe y Troncoso (1925-1926, 1933-1934), Thorburn (1927), Werner (1932), and Bruce (1933).

In 1927, Thorburn photographed the angle of the anterior chamber of human subjects, using a stereoscopic camera in combination with the point-olite-lamp of Gullstrand as a source of light. The author stated that in some cases the exposures were as short as 3-4 seconds. The magnification gained by the camera was 1.7 times. The difficulties encountered by Thorburn rendered his method of photographing the angle of no practical value. The exposures were too long and the patient could not very well hold his eye still for 3 or 4 seconds, which was the minimum time of exposure. The magnifications obtained were too small to detect fine details of the angle (fig. 1).

In the last few years, new instruments and photographic cameras have been devised, which, used in combination with supersensitive films, have made it possible to take photographs of the angle with considerably larger magnifications than heretofore, and with much shorter exposures. The instruments used in the technic here to be presented are: the most recent model of contact glass devised by Koeppe, called "C" glass by the makers, Bausch & Lomb Optical Company of Rochester, New York; the Leitz Ultrapak Microscope, equipped with the 3.8x objective and ocular no. 4, mounted on a special pillar stand; and the Leica camera mounted on the micro-ibso attachment. The film used is supersensitive panchromatic. The magnification gained is 15 diameters with an exposure of 1/20 of a second.

Goniophotography of cats and dogs

The animal is anesthetized with subcutaneous injections of pernocton (sodium sec. butyl-bromallyl barbitu-

Fig. 1 (Castroviejo). Photograph of a normal angle of the anterior chamber of a human subject, by Thorburn.

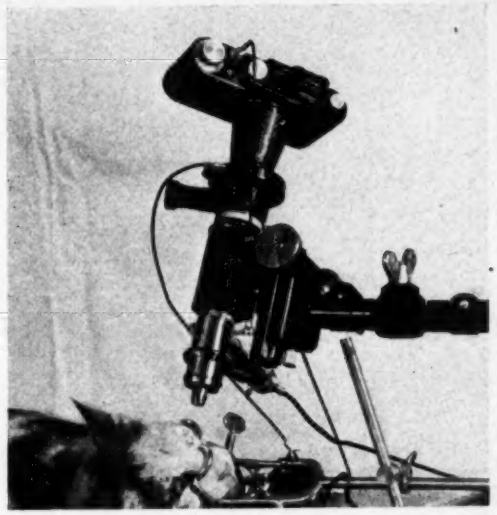

Fig. 2 (Castroviejo). Equipment assembled for photographing the angle of the anterior chamber of a cat.

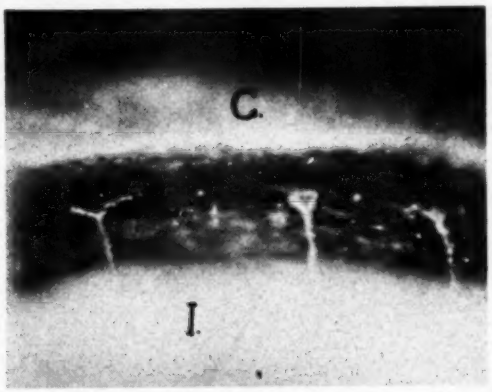

Fig. 3 (Castroviejo). Photograph of the angle of the anterior chamber of a cat. C., cornea, P.L., pectinate ligament; I., iris.

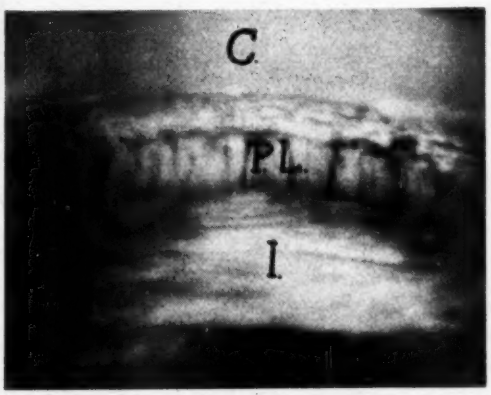

Fig. 4 (Castroviejo). Photograph of the angle of the anterior chamber of a dog. C., cornea, P.L., pectinate ligament; I., iris.

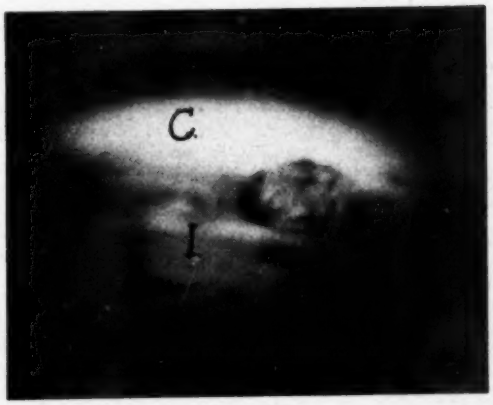

Fig. 5 (Castroviejo). Small piece of glass in the angle of the anterior chamber of a human subject.

rate in a 10-percent solution) and held in a convenient position. It is better, especially in small animals, to make a canthotomy to obtain sufficient opening of the palpebral fissure for the insertion of the contact glass. Sometimes it is also necessary to remove the nictitating membrane, which often interferes greatly. Adrenalin, 1:1000, is instilled in the eye to stop hemorrhage. The conjunctival sac is freely irrigated with normal saline solution to wash out mucus and other foreign substances which, interposed between the contact glass and the cornea, may disturb the observation. The contact glass, which must be very clean in order to obtain the best results, is placed in position with the margins of the eyelids surrounding the glass and lying in the groove around its border. The glass is thus held by the eyelids and pressed tightly against the bulb. Normal saline is then injected to fill the space left between the concave surface of the contact glass and the cornea. For this maneuver a small cannula attached to a rubber bulb, similar to that which is used for the irrigation of the anterior chamber of the eye, may be employed. The external surface of the glass is then washed with distilled water and carefully dried with a piece of gauze. If the saline solution comes in contact with the external surface of the glass, the rapid evaporation of the fluid leaves a coat of salt deposit which greatly disturbs the view. The Ultrapak, equipped with the Leica camera, as indicated in figure 2, is now placed in position. The observation of the angle is made through the lateral view-finder of the micro-ibso attachment. Focusing is easily done with the mechanism of the special pillar stand, which allows movements of the Ultrapak in every direction. When the desired field of the angle has been brought into focus, the prism which deviates the microscopic image towards the lateral view-finder is quickly removed with a special cable release. Photographs of the image now received by the camera may be taken with exposures of one twentieth of a second. As the camera has a winding mechanism that permits rapid shifting of film between exposures, several photographs may be taken in a very short time. Of these, there are usually several distinct and clear pictures.

Figures 3 and 4 show photographs of the angle of a cat and dog, respectively, reproducing with a great deal of accuracy the topography of that region.

Goniophotography of the human eye

The patient is placed in the recumbent position and the eye anesthetized with several instillations of holocaine hydrochloride, 1-percent solution. The conjunctival sac is irrigated with normal saline solution, and the contact glass placed in position. The air bubble between the cornea and the concave surface of the glass is removed by irrigation with saline solution. The rest of the technic is the same as previously described for the photography of the angle in animals. Figure 5 shows a photograph of a small piece of glass in the lower part of the angle of the anterior chamber of a patient, who, two years previously, was cut in the eye by glass (windshield broken by a bullet). At that time a piece of glass was removed from the eye in a hospital. The eye remained comfortable until ten days before the photograph was taken when slight irritation with moderate congestion of the lower part of the eye was noted. The piece of glass could not be seen by any other means of examination than by gonioscopical methods.

I wish to express my sincere thanks to Dr. Thorburn for his permission to reproduce the photograph shown in figure 1, and to Dr. Bruce for his kind cooperation in allowing me to photograph the patient here reported.

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Bibliography

Bruce, G. M. Visualization of foreign bodies in the iridocorneal angle. A simple method of stereoscopic gonioscopy. Arch. of Ophth., 1933, v. 10, pp. 615-620.

Koeppe, L. Die Mikroskopie des lebenden Auges. Berlin, J. Springer, 1920-1922.

Salzmann, M. Die Ophthalmoskopie der Kammerbucht. Ztschr. f. Augenh., 1915, v. 34, pp. 26 and 160.
Thorburn, T. W. A gonioscopical study of anterior peripheral synechiae in primary glaucoma. Thesis, Stockholm, 1927.
Trantas, A. L'ophtalmoscopie de l'angle irido-cornéen (gonioscopie). Arch d'Opht., 1918-1919, v. 36, p. 257.
Troncoso, M. U. Gonioscopy and its clinical applications. Amer. Jour. Ophth., 1925, v. 8, p. 433.
———. Gonioscopy in glaucoma. Contributions to Ophthalmic Science. Jackson's Birthday Volume. Menasha, Wis., G. Banta, 1926.
———. Gonioscopy. Its methods and results especially in glaucoma. Trans. XIV. Internat. Congr. Ophth., Madrid, 1934, v. 1, pt. 3, p. 25.
———. and Reese, A. B. Gonioscopic findings after Elliot operation. Trans. Brit. Ophth. Soc., 1933, v. 53, p. 366.
Werner, S. Gonioscopische Untersuchungen bei Glaucoma primarium. Copenhagen, Levin and Munksgaard, 1932.

REFLEX EFFECTS FROM CRITICAL SEEING

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Statistically reliable data are presented which indicate that the performance of critical visual tasks, such as reading, produces certain reflex effects which may be regarded as important criteria for revealing the expenditure of human energy in seeing. The experimental results indicate (1) that nervous muscular tension, developed as a result of reading for prolonged periods, decreases as the intensity of illumination under which the reading is done increases; and (2) that the heart rate progressively decreases as the duration of the visual task increases and that this decrement in the heart rate is much greater under one foot-candle than it is under 100 foot-candles. These reflex phenomena of an integrative character are correlated with experimental data pertaining to threshold visibility and used as criteria for determining desirable levels of illumination for close visual work.

Studies in physiologic optics are usually concerned with phenomena which immediately follow the presentation of the stimulus. Relatively little attention has been given to certain reflex effects concomitant with critical seeing which are observable only after a more or less protracted period of visual effort. The development of nervous muscular tension[1] and the depression of the heart rate[2] are examples of such reflex phenomena, which arise as a result of the performance of critical visual tasks. These effects are significant in general physiology and are important in ophthalmology as criteria for revealing the expenditure of human energy in the process of seeing. The results of two extensive researches involving nervous muscular tension and heart rate, respectively, are briefly reviewed here as a basis for a discussion and interpretation of reflex effects from the viewpoint of ocular hygiene. The data from a major research concerning the visual functions[3] are also reviewed for purposes of establishing correlations with reflex phenomena.

The data

In the researches on tenseness and heart rate, reading was selected as the visual task because of its obvious advantages as a critical, uniform, and universal visual task. The development of tenseness was quantitatively appraised by recording the pressure which was *unknowingly* exerted upon a broad knob of a key by the fingers of the left hand which rested naturally upon this device. The investigation involved intensity of illumination as the only systematic variable, and the interpretation of the experimental results is based upon the assumption that the subjects were normal from a physiologic standpoint.

It will be noted from figure 1A that the average pressure exerted upon the key during a 30-minute period of reading decreased from 63 to 43 grams as the intensity of illumination upon the book increased from 1 to 100 foot-can-

dles, respectively. These data represent the geometric means of the average individual results from 14 subjects. The research involved a total of 308 periods of reading under intensities of illumination of 1, 10, and 100 foot-candles respectively. The relative probable errors of the data are considerably less than 1 percent and hence the decrement in tenseness is to be regarded

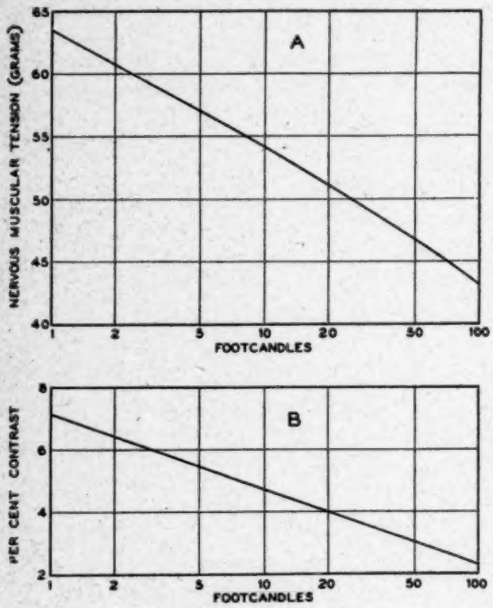

Fig. 1 (Luckiesh and Moss). The upper plot shows the relationship between indicated nervous muscular tension and intensity of illumination. The lower plot shows the relationship between the contrast required for threshold visibility (of an object equivalent in size to the book type in the tenseness experiment) and intensity of illumination. It will be noted that both relationships are generally logarithmic in character. The probable errors of the data are less than one percent.

as a real and decisive one. Therefore, it is concluded that the differences in psychophysiologic reactions resulting from reading under different intensities of illumination are of such definiteness and magnitude that they are capable of creating muscular strains which are readily measurable. A detailed analysis of these data is presented elsewhere.[1]

The investigation of heart rate during reading involved both the duration of the visual task and the intensity of illumination as the systematic variables. The heartbeat was recorded by means of a cardiotachometer adjusted to operate only upon the R phase of the pulse wave. The electrodes were located in the region of the base and apex of the heart, respectively.

The influence of critical visual effort upon the heart rate is clearly indicated by the relationships presented in figure 2. The important facts revealed by these data are (1) that the heart rate progressively decreases as the duration of the visual task increases and (2) that this decrement in heart rate is much greater under 1 foot-candle than it is under 100 foot-candles. The data plotted in figure 2 represent the geometric means of the individual results from 7 subjects. The probable errors of the data are about 0.5 of a heartbeat per minute. Since the observed decrements in heart rate are several times as great as the corresponding probable errors, they are to be regarded as real and significant from a statistical viewpoint. This research involved 140 sixty-minute periods of reading. It has been shown elsewhere that the depression of the heart rate is attributable to visual effort rather than to mere photic stimulation[2].

The results of these investigations involving reflex phenomena of an integrative character invite correlations with certain quantitative studies of threshold visibility involving discrete momentary presentations of single test objects. The data summarized in figure 3 are ideal for this purpose and are so introduced into this discussion. They present the relationships which exist between size, brightness, and contrast as variables of the visual threshold determined from over 100,000 separate observations. The statistical reliability of these data is established by the fact that the relative probable errors are of the order of 1 percent. The investigations from which these data have been derived are described in detail elsewhere[3].

Ocular hygiene

There is much philosophical evidence[4] to support the contention that modern visual tasks, involving long periods of close visual work and the per-

ception of minute objects under meager light and unnatural lighting, represent an abnormal use of the visual sense. The abnormal visual task performed under subnormal conditions for seeing is a combination of circumstances worthy of suspicion. The results of a recent research relating ocular fatigue and involuntary-muscle changes. The results from these radically different researches are in theoretical agreement and strongly support the conclusion that critical seeing, under unfavorable conditions, produces far-reaching physiologic effects.

A correlation between the depression

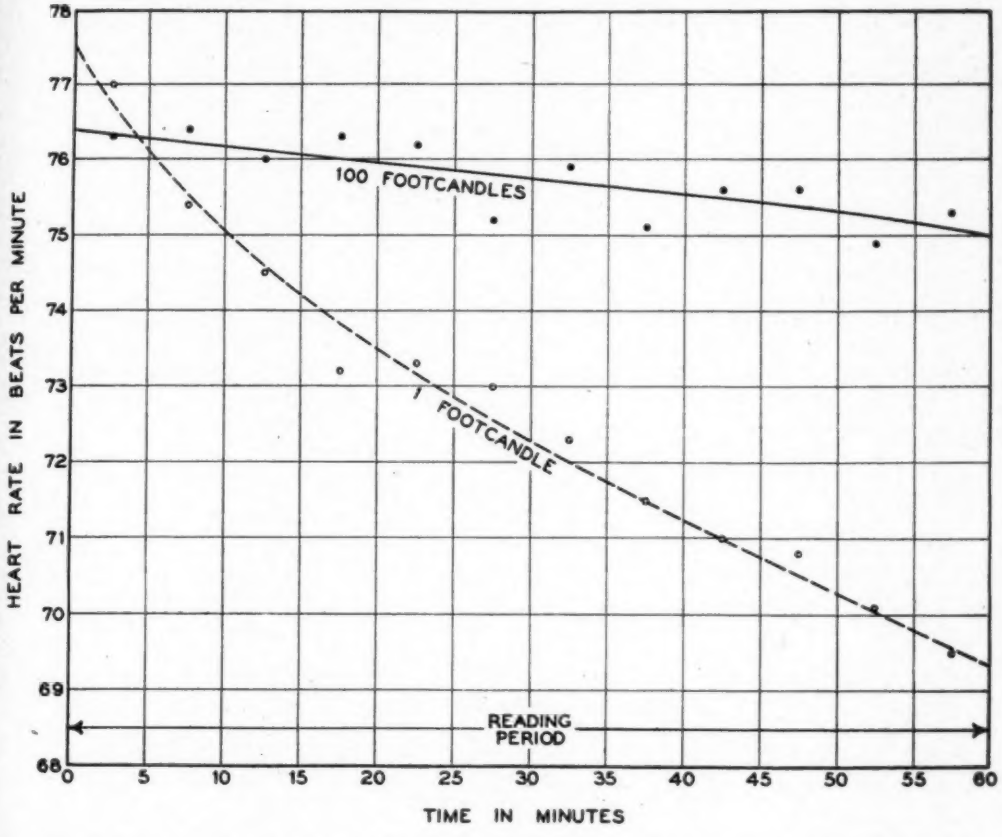

Fig. 2 (Luckiesch and Moss). The relationship between heart rate and duration of the visual task for levels of illumination of 1 and 100 foot-candles. These are composite curves derived from the individual data of seven subjects. The probable error of these data are generally less than 0.5 of a beat per minute.

with long-continued close work[2] indicate that such a suspicion of deleterious effects has considerable foundation in fact. Experiments upon tenseness and heart rate indicate that critical visual tasks, such as reading, produce reverberations in the central nervous system which are manifested in several ways[5]. In these cases, the effects of visual effort were indicated by both voluntary-

of the heart rate and unfavorable conditions for seeing is definitely established by the fact that the decrement in heart rate is also a function of the duration of the visual task. It is axiomatic that strain and fatigue are functions of time. The fact that a relatively large depression of the heart rate was observed under 1 foot-candle, but not under 100 foot-candles, is evidence that

the visual organism was abnormally taxed in the former case. Since intensity of illumination is a controllable factor, it may be concluded that the organism is unnecessarily handicapped

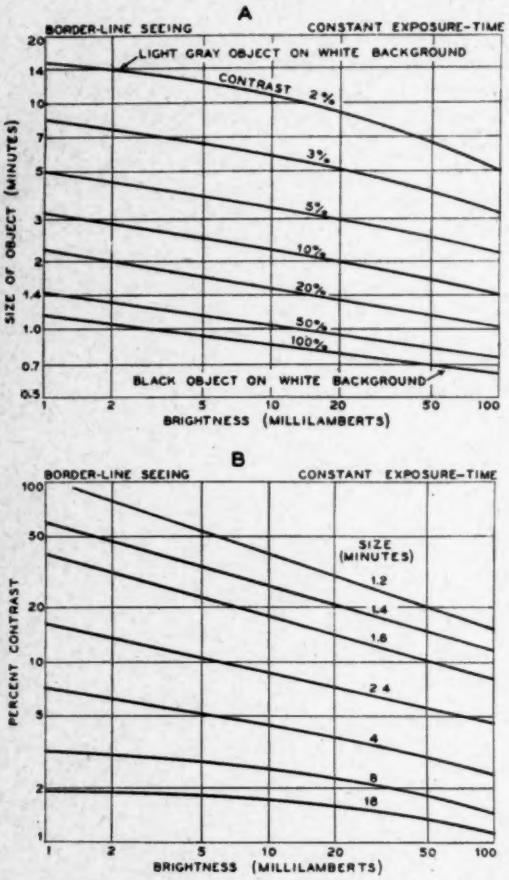

Fig. 3 (Luckiesh and Moss). The upper plot shows the relationships between size and brightness required for threshold visibility for various degrees of contrast between the test object and its background. Contrast is here defined as the ratio of the brightness-difference (between the object and its background) to the brightness of the background. This ratio is expressed as **percent contrast.** The lower plot shows the relationships between contrast and brightness for various sizes of test object. It will be noted that the relationships are of a logarithmic character.

by inadequate levels of illumination. From a detailed analysis of the data[2], it appears that a rest period of about a half hour would be required to attain the normal initial heart rate after reading for an hour under 1 foot-candle. This relationship between the effects of visual effort and visual relaxation may eventually prove to be a useful criterion in the field of ocular hygiene.

It is not suggested that the decrements in heart rate shown in figure 2 are inherently important as cardiac phenomena. However, they do denote a definite change in metabolism which may be quite significant with respect to other physiologic functions. For example, it is at least conceivable that these changes in metabolism may be symptomatic of deleterious inhibitions of digestive and other visceral processes. Since the heart rate is depressed as a result of the performance of critical visual tasks under improper lighting, it is reasonable to suppose that similar and perhaps greater effects would be observed in cases involving ocular defects. Hence these data, as well as those pertaining to nervous muscular tension, may have a direct clinical significance.

The relationship between tenseness and intensity of illumination is generally logarithmic in character as is shown in figure 1A. A similar relationship also exists between intensity of illumination and certain variables of the visual threshold, as is obvious from figure 3 and figure 1B. The fact that visibility and tenseness vary alike with respect to intensity of illumination is additional evidence that muscular tension is directly related to intensity of illumination and is *not* a function of unknown or uncontrolled variables in the technic of the tension experiment. The positive correlation between these factors indicates that ease of seeing, as revealed by reflex phenomena, corresponds to the visibility of the objects of regard. Hence, the significance of threshold-visibility data is extended to ease of seeing under conditions far superior to those pertaining to the visual threshold[6].

It may be concluded from the experimental data presented herein, that intensities of illumination of 100 foot-candles at least are desirable for visual tasks as difficult as reading ordinary black print upon white paper. This conclusion is based upon the relationships between intensity of illumination and

momentary appraisals of visual efficiency, as indicated by measurements of visual acuity, contrast sensibility, and speed of retinal impression; and upon the relationships with integrative reflex phenomena, as revealed by measurements of nervous muscular tension and decrement of heart rate. It is also supported by a consideration of the evolution of the eyes under the high intensities of natural lighting. However, the conclusion regarding the desirable quantity of light for critical seeing involves the assumption that the light is properly distributed within the visual field[7]. In the three researches which have been discussed, an indirect lighting system was used. Therefore, glare[8] and distracting contrasts in brightness were avoided.

Upon the assumption that intensities of illumination of the order of 100 foot-candles are desirable for reading, it is obvious that much higher levels are required when the visual task involves less favorable conditions for seeing, such as low contrasts or dark backgrounds. It is possible definitely to appraise the relative difficulty of certain visual tasks when the physical characteristics of the objects of regard are describable. The mutual relationships presented in figure 3 between the factors of size of object, its contrast with its background, and brightness form a frame of reference for such appraisals. For example, it will be noted from figure 3A that an object one minute in size with a contrast of 50 percent with its background requires approximately five times as much light for equal visibility as does an object of the same size but having a maximum contrast of 100 percent. As a practical illustration of the application of these data, it may be shown that a telephone directory requires about 3 times as much light in order to be equivalent in visibility with excellent printing of the same size on fine white book paper. In view of these concepts of adequate light as an aid to seeing, the present levels of illumination averaging less than 5 foot-candles are ridiculously low[4].

References

[1] Luckiesh, M., and Moss, F. K. A correlation between illumination intensity and nervous muscular tension resulting from visual effort. Jour. Exp. Psych., 1933, v. 16, p. 540.

[2] ———. The effect of visual effort upon the heartrate. Jour. Gen. Psych., in press.

[3] Cobb, P. W., and Moss, F. K. The four variables of the visual threshold. Jour. Frank. Inst., 1928, v. 205, p. 831.

———. The relation between extent and contrast in the liminal stimulus for vision. Jour. Exp. Psych., 1927, v. 10, p. 350.

[4] Luckiesh, M., and Moss, F. K. Seeing—A partnership of lighting and vision. Baltimore, Williams and Wilkins Co., 1931.

[5] ———. Size of pupil as a possible index of ocular fatigue. Amer. Jour. Ophth., 1933, v. 16, p. 393.

[6] Cason, H. Organic psychology II: The psychological organism. Psych. Rev., 1934, v. 41, p. 356.

[7] Luckiesh, M., and Moss, F. K. The human seeing-machine. Jour. Frank. Inst., 1933, v. 215, p. 629.

[8] ———. The new science of lighting. Trans. Illum. Eng. Soc., 1934, v. 29.

———. Muscular tension resulting from glare. Jour. Gen. Psych., 1933, v. 8, p. 455.

Cobb, P. W., and Moss, F. K. Glare and the four fundamental factors in vision. Trans. Illum. Eng. Soc., 1928, v. 23, p. 1104.

OIL CYST OF THE ORBIT WITH CARCINOMATOSIS

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The author has found no report in the literature of an orbital oil cyst of dermoid origin which had become malignant.

In his case the condition was found in a middle-aged woman whose left eye had been more prominent than the right for ten years or more, the prominence having noticeably increased during the previous three months. At operation the cyst was ruptured, expressing a dark oily fluid. Pathological examination proved it to contain squamous-celled carcinomatous tissue. Heavy doses of radium failed to check the progress of the carcinoma and the patient died with a generalized carcinomatosis. Read by invitation before the American Academy of Ophthalmology and Otolaryngology, in Chicago, September 11, 1934.

Oil cysts of the orbit are not uncommon. They belong to the group of dermoid cystic tumors. There are very few cases of orbital tumors in which a positive diagnosis of the true nature of the tumor can be determined before explorative incision has been made; this is especially true if the growth be deep seated.

Henry G. Connell[1] mentions that "Berlin has collected seventy-three cases of orbital tumors, twenty-three of which were undoubtedly dermoid cysts."

In a rather careful perusal of the literature, I could find no definite reference to an orbital oil cyst of dermoid origin which had become malignant. However, Berlin[2] does mention that a degenerative dermoid cyst may be the point of origin of an epithelioma. The literature contains many reports of malignant tumors of the orbit. Benedict[3], in his comprehensive article, entitled "Tumors and cysts near apex of orbit," reported eight cases, all of which were malignant, but not of dermoid origin.

Most histories of oil cysts have their beginnings in childhood, the cysts gradually increasing in size until it becomes necessary to remove them in order to save vision. Henry G. Connell gives a long description of a compound oil cyst of the orbit which began in childhood. The eye finally had to be enucleated in order to remove the entire cyst. V. Camp[4] reported cases of two dermoid tumors in adults which had been noticed in early childhood and had gradually increased until they had to be removed. In deSchweinitz's[5] "Diseases of the Eye," it is stated that "Berlin divided orbital cysts into two principal groups, cephaloceles and true cysts. True cysts may be classified as cysts from constriction, which are derived from congenital meningoceles (Klingelhoffer) as extravasation-cysts, which are very rare; as dermoids, which are the most frequent cystic tumors growing in the orbit, as mucous-cysts, which may communicate with the nose, and as echinococcus-cysts."

In E. Rasquin's article[6], entitled, "Multilocular internal dermoid cysts of orbit" (one oily), he begins by saying that the following observations appear interesting enough to warrant their publication.

"A child, six years old, was brought to my consultation room by the mother, who stated that for several months a tumorlike projection had made its appearance in the internal angle of the right orbit, and that the mass was growing so rapidly that she had become alarmed. My examination shows a tumor occupying the internal third of the right upper eyelid, which descends full length from the base of the nose parallel to the lacrimal sac. The tumor is about the size of a small walnut, but is not adherent to the skin. It is not freely movable and seems to bury itself in the orbit. A puncture made with a large needle on a syringe does not draw forth any liquid, but the needle has an oily glow and is covered with a degenerated greasy mass after its removal.

"The eye is slightly exophthalmic and is displaced down and out; vision is normal; the fundus is normal." He states, "We accepted the diagnosis of a dermoid cyst of the orbit and decided to excise the tumor. A curvilinear incision is made beneath the orbit

running up to the internal angle of the orbit and an encapsulated tumor mass is uncovered which is easy to dissect. The tumor is found to be divided into partitions; the anterior one passes in front of the pulley of the superior oblique and extends downward. The other extends up toward the back of the orbit. Both are removed." He further states that "upon inspecting the wound a second tumor of an entirely different appearance is found. It appears as a whitish-gray mass, spherical in shape, and is removed in capsule. Both tumors lie outside the muscle funnel.

"The contents of the first tumor is made up of yellowish liquid of an oily appearance, while the contents of the second tumor resembles a sebaceous cyst." He summarizes by saying that "The tumors contained two distinct elements; the one, oily, formed of a yellowish liquid which discharges readily when the capsule is cut—the other, much more solid, resembles the contents of a wen. The patient made an uneventful recovery."

Arnold Knapp[7] reported a case (female, aged 27 years) and gave a description and chemical analysis of the contents of the cyst. He mentioned that a firm mass was felt on palpation within the outer orbital margin. This was also present in my case. Microscopic examination was as follows:

"The sac wall was composed of thin connective tissue without any papillary projections. There was an inner lining of several layers of epithelial cells and keratin. The cyst wall contained very many sebaceous glands and a few hair follicles, and in the surrounding tissues were may dilated venules. The oil within the cyst contained no free fatty acid: 36.02 cholesterol, and iodine No. 124. He further states that "oil cysts of the orbit belong to the group of dermoid-cyst tumors. The proportion of oil contents depends upon the preponderance of sebaceous glands."

The case of oil cyst, which I am reporting, is interesting because of the fact that it was not noticed so early in life as the other cases that I have cited, and secondly that when examined microscopically it proved to be a carcinoma, grade 2, on basis of 1, 2, 3, 4.[8]

Case Report

A Danish woman, aged 53 years, consulted me because she had noticed that the left eye was becoming more prominent than the right. She had had pain in the outer upper angle of the left eye for the past ten days. She had also noticed that the upper part of the conjunctiva was red and inflamed. She did not complain of double vision.

Careful questioning of the husband elicited the fact that the left eye had been more prominent for the past ten years or more, neither of them having paid any attention to it. They were both certain that the eye had become much more prominent during the past three months.

Fig. 1. (Jones). External appearance of oil cyst of the orbit.

Examination: The eye was proptosed downward and inward. The upper lid covered about one third of the cornea. Digital examination revealed a bone-like mass wedged over the outer angle of the orbit. This immediately suggested the possibility of an osteoma of the orbit. The vessels in the upper portion of the conjunctiva were enlarged and the conjunctiva in that region looked inflamed. The cornea was clear; the pupil reacted to light and accommodation; the media were clear. There was about one diopter of swelling of the nerve head. Movements of the eye were limited outwardly and upwardly. The vision in the right eye was 20/30 and in the left 20/40, when corrected with minus spheres. The anterior auricular, the submaxillary, and the submental glands were not palpable. X-ray examination failed to reveal any evidence of osteoma. A general physical examination was negative, except for marked obesity.

Operation: The patient was rather anxious not to take ether, and so the operation was attempted under local anesthesia; There was no complaint of pain. It was planned to do the typical Kroenlein operation. After incision and dissection of the skin had been made down to the orbital margin, the bone-

like mass could be removed from the orbital rim and was found to consist of dense cartilage. There seemed to be considerable room, and instead of the Kroenlein operation, it was possible, with Sewell's ethmoid retractor, to retract the eye sufficiently to allow dissection around the mass; however, as the dissection was carried farther back into the orbit, there was not room to continue without rupturing the cyst.

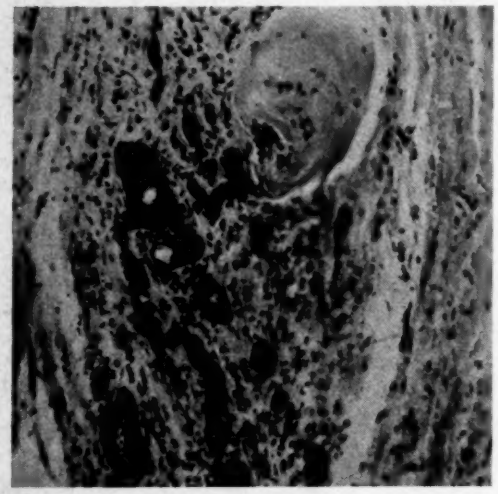

Fig. 2. (Jones). Photomicrograph of tissue from oil cyst of orbit.

This was done, and about a dram of dark oily fluid escaped. After the collapse of the cyst, it was possible to dissect down to the apex of the orbit outside of the muscle funnel and remove what was thought to be the entire cyst, following which the eye could be pressed back into the orbit very easily. A small rubber drain was inserted, the wound was closed, and a pressure bandage applied.

The entire cyst was sent away for pathological diagnosis.

The patient had very little reaction, and the eye remained back in the orbit after the third day.

Pathology: The tissue was dense, hard, and cystic. Sections of the wall of the cystic tumor showed no epithelial lining but consisted of a dense, thick, hyaline tissue lined by a single layer of endothelium. In the cyst wall and deeper tissue, there was squamous-cell carcinoma in masses, cords, and in acinous formation lying within the tissue and within lymphatic spaces. In addition to the carcinoma, there was much inflammation, chronic and subacute in nature, as evidenced by the presence of scattered collections of lymphocytes, few plasma cells, and an occasional eosinophile and polymorphonuclear leucocyte.

Hemorrhage had taken place at some time, which was shown by the presence of scattered blood pigment and characteristic "crystalline" spaces. The carcinoma was grade 2 (high).[8]

Some of the hardness and denseness of the tissue might have been due to the rather strong solution of formaldehyde in which it was placed.

A week elapsed before the pathological report was received. In the meantime, the patient apparently had made an uneventful recovery with the exception that the anterior auricular glands were palpable. She refused to submit to an exenteration, and radium therapy was advised. The patient was finally given 23,900 mg. hrs. of radium over the left temporal, cervical, and nasal regions, fourteen days after the operation. Following this she had a rather violent reaction which was characterized by edema of the lids and some nausea. This large amount of radium seemed to have had very little, if any, effect on the progress of the carcinoma. The eye again became proptosed. I informed the husband that her condition was hopeless. They put themselves in the hands of a cancer "quack," who removed the entire side of the face, including the nose and ear, with an arsenical paste. The patient died seven months later with a generalized carcinomatosis.

Conclusions

Dermoid oil cysts may become malignant. A pathologist should always be at hand at the time of operation for any orbital tumor and have a frozen section made immediately, regardless of how benign it may appear.

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References

[1] Connell, H. G. Arch. of Ophth., 1882, v. 11, p. 338.
[2] Berlin. Krankheiten der Orbita. Leipzig, 1880, v. 1, pp. 504 and 744.
[3] Benedict. Amer. Jour. Ophth., 1923, v. 6, p. 183.
[4] Camp, V. Arch. of Ophth., 1879, v. 8, p. 373.
[5] de Schweinitz. Diseases of the eye. Ed. 9, Philadelphia, W. B. Saunders Co., 1924, p. 638.
[6] Rasquin, E. Bull. Soc. belge d'Opht., 1932, no. 64, pp. 78-80.
[7] Knapp, Arnold. Arch. of Ophth., 1923, v. 52, p. 163.
[8] Broders, A. C. Collected papers of the Mayo Clinic and the Mayo Foundation, 1924, v. 16, p. 1165.

A STUDY OF AN OCULAR INFECTION INDUCED EXPERIMENTALLY WITH BACTERIUM MONOCYTOGENES

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For the eyes of laboratory animals, B. monocytogenes possesses a remarkable infectivity, most severe for guinea pigs, less so for rabbits and monkeys. The severe type of reaction, as it occurs experimentally in guinea pigs, consists of an acute conjunctivitis, exudate, and turbidity and vascularity of the cornea. Pathologically, the infection is characterized by a massive infiltration of the conjunctiva and cornea with monocytes, and by the appearance of congested capillaries which give the appearance of pannus in the cornea. Although the infection remains localized in the inoculated eye, a study of the circulating blood revealed occasional instances of a distinct mononucleosis which did not, however, parallel the clinical symptoms. Animals recovered from an eye infection, exhibited some local resistance to subsequent reinfection with the organism.

From the Bacteriological Laboratories of the Oscar Johnson Institute, Washington University, School of Medicine. Conducted under a grant from the Commonwealth Fund of New York City.

In connection with experiments conducted in this laboratory on the etiology of trachoma, it has been necessary to determine the infectivity of a variety of bacteria in the eyes of different animals. While the organisms studied for this purpose have included in great part many unidentified bacteria isolated from the conjunctiva of patients with trachoma or folliculosis, the infectivity of Staphylococcus, Streptococcus, Pneumococcus, diphtheroids, Bacterium granulosis, and Bacterium simiae has also been studied. Irrespective of the virulence of an organism as determined by other methods, it has not been possible to induce infection in the eye by direct instillation. Even in those animals in which subconjunctival injection of bacteria is followed by severe infection, the reaction does not extend into the cornea. Traumatization of the cornea by scarification, sandpapering, or rubbing with fine sand followed by instillation of young cultures also causes no infection, so that up to the present time corneal infection has been accomplished artificially only by direct intracorneal injection. Consequently, it was to some degree surprising to discover in a study unrelated to the present investigation the readiness with which Bacterium monocytogenes causes infection of the eye. The phenomenon was a curious one and appeared worthy of further study and elaboration.

It will be recalled that in 1926, Murray, Webb, and Swann[1] isolated Bact. monocytogenes as a hitherto undescribed organism from a spontaneous epidemic occurring among rabbits in the laboratory. Because of its ability to stimulate an excessive production of monocytes, this organism was named Bacterium monocytogenes. In 1927, the same organism was isolated by Pirie[2] from South African gerbilles and provisionally named by him Listerella hepatolytica or Tiger River Bacillus. Two years later Nyfeldt[3] cultivated a small rod virulent for rabbits from a

patient with infectious mononucleosis. Since the induced mononucleosis the author concluded that it was similar to Bact. monocytogenes, but because of minor differences from previously described strains of this organism, Nyfeldt designated it as Bact. monocytogenes hominis. Shortly after the present study was begun, Anton[4] reported that Bact. monocytogenes instilled into the eyes of rabbits, causes an acute conjunctivitis within one or two days. After three to five days there is clouding of the cornea and the appearance of superficial and deep-lying vessels. These manifestations recede and the eye recovers its normal aspect within two to four weeks. Only one out of 21 rabbits tested by instillation of the eye died, and in this instance death was preceded by generalized septicemia.

Experimental

Two strains of Bact. monocytogenes, No. 204 and No. 205, were received from Dr. A. B. Wadsworth of the New York State Health Department in Albany, New York. These cultures were originally isolated by Dr. Murray in England.

The infectivity of both strains was studied in the eyes of rabbits, guinea-pigs, and monkeys. While the method of inoculation was varied in a few animals, the technic of choice was that of simple instillation with saline suspensions of culture, grown 24 to 48 hours on blood agar.

I. Infection in the eyes of rabbits. In studying the reaction of the eyes of rabbits to infection due to Bact. monocytogenes, nine animals were observed. Four were inoculated by swabbing and five by instillation of a saline suspension. A conjunctivitis of varying intensity appeared in all the animals from one to three days following the introduction of culture. This condition persisted for five to ten days. In two rabbits, moreover, there was an invasion of the cornea by the conjunctival blood vessels on the fifth and third day, respectively. In one rabbit, the corneal vascularization disappeared within four days, while in the second, the eye was enucleated for pathological examination before regression had occurred. In addition, three of the nine animals exhibited at the limbus a curious formation, four to seven days after inoculation, which consisted of highly vascularized, raised, follicular masses suggestive of a phlyctenular reaction. This response did not appear to be related either to the severity of the conjunctivitis or to the subsequent development of pannus. A more detailed description of the conjunctivitis and corneal vascularization is given below in connection with the infection in guinea-pigs.

The observations of Murray, Webb, and Swann indicate that Bact. monocytogenes is more frequently isolated from young rabbits. An experiment was accordingly undertaken to determine the relative susceptibility of the eye to infection by this organism in young and adult rabbits. Six rabbits weighing between 1000 and 1300 grams, and six larger rabbits weighing between 2100 and 2400 grams were inoculated. As in previous experiments, strain No. 205 was instilled into the conjunctival sac of the right eye, but no reaction occurred in any of the animals. A repetition of this experiment was undertaken two weeks later with a heavier suspension of the same culture. One of the young rabbits and one of the adult rabbits showed definite infection of the lids without corneal involvement, while the remaining 10 appeared to be unaffected. This experiment, then, failed to indicate that young rabbits may be infected with greater readiness than adult rabbits.

From the experiments in rabbits, therefore, it may be concluded that Bact. monocytogenes is capable of inducing a severe conjunctivitis only irregularly when introduced into the eye by any one of three methods: (1) direct subconjunctival inoculation, (2) swabbing, or (3) instillation. While the infection reported here is not of the pronounced type nor frequency reported by Anton[4], this study confirms essentially his work. The difference in results may well be quantitative due to variation in degree of virulence of the strains of Bact. monocytogenes. The infection as

observed in this laboratory appears in one to two days and usually subsides within four to seven days. It never extends to the uninoculated eye and in a few instances the cornea may show slight vascularization. In no case, however, is a dense "curtain pannus" observable, as has been noted in this laboratory[5] in rabbits made hypersensitive to bacteria or proteins. Yet the occasional corneal reaction to Bact. monocytogenes resembles the earlier stages of the vascularization accompanying the latter condition.

II. Infection in the eyes of guinea-pigs. A number of experiments were conducted in guinea-pigs and it was found that in these animals, severe eye infections were induced with great frequency and regularity. Consequently a single typical experiment will be described to illustrate the infectivity of Bact. monocytogenes for the eyes of guinea-pigs.

Nine animals were tested by direct instillation of a heavy suspension of Bact. monocytogenes (No. 205) into the conjunctival sac of the right eye. On the following day seven of these animals showed eye reactions of varying intensity; in the remaining two, infection did not appear until the third and fifth days. Except for the initial delay, however, the course of the infection was similar in all the animals. Thus, the first indication of infection was seen on the first day as a slight injection of the upper and bulbar conjunctivae, while a definite edema of the upper conjunctiva occurred in the animals more severely infected, giving an impression of an advancement of the conjunctiva over the superior limbus. On the second day there was a definite but slight clouding of the cornea at the limbus, with marked exudation and increased edema. At this time, some of the animals showed definite loops of blood vessels penetrating into the cornea from the superior limbus, while the remaining animals showed beginning vascularization within the next day or two. From then on, the vascularization increased in intensity so that vessels were observed eventually extending in loop formation from one half to three quarters of the corneal circumference. In some of the animals there appeared at the superior limbus the elevations resembling follicles or phlyctenules which have been described above in rabbits. The infection reached maximum intensity about the eighth day, after which it began to subside. Complete regression of the infection was effected slowly and required weeks.

An experiment similar to that reported above was made using culture No. 204 in five guinea-pigs. The reaction was essentially the same as that occurring with culture No. 205. All of the animals developed severe eye reactions including ulceration of the cornea. One died on the eleventh and one on the twelfth day. In general, the acute phases of the reaction were over about the ninth or tenth day. From that time on the reaction subsided but the cornea continued to have a "ground glass" appearance and fragments of vessels were discernible as long as three to four weeks following the instillation.

It is evident from these experiments that Bact. monocytogenes possesses an exquisite pathogenicity for the eye of guinea-pigs. Not only does a marked conjunctivitis occur following simple instillation of the organism into the conjunctival sac but corneal turbidity and vascularization may appear as early as the second day. Grossly, the corneal vascularity resembles in all respects the pannus of hypersensitiveness seen in rabbits following sensitization with bacteria or proteins. The reaction is still intense after eight to ten days, at which time it gradually subsides. As was found in the case of the rabbits, infection does not extend to the uninoculated eye. It is obvious that the reaction in guinea-pigs is much more severe than that observed in rabbits.

Since the preceding experiments were performed in guinea-pigs weighing less than 250 grams, it was desirable to investigate the infectivity of Bact. monocytogenes in larger animals also. For this purpose nine guinea-pigs weighing between 435 and 475 grams and as controls, nine weighing from 235 to 250 grams were inoculated. Culture No. 205 was instilled into the conjunctival sac

of [illegible] eye of each of these animals. T[illegible]s of this experiment indicated [illegible]hat no variation is manifested [illegible]e of ocular reactivity which may [illegible]ributable to difference in age of [illegible]nimal, since an equal number of [illegible] young and adult guinea-pigs was [illegible]ected.

III. Infection in the eyes of monkeys. A few experiments were made in monkeys with both strains of Bact. monocytogenes. Two monkeys were inoculated, one with strain No. 204, the other with No. 205, by injection of a suspension in the conjunctiva of the right eye and by swabbing in the left eye. An acute inflammatory reaction developed in both eyes of both animals, but this was transient and preceded no corneal changes. Subsequently the experiment was repeated, this time swabbing both eyes of the same monkeys with material from a guinea-pig with a severe conjunctivitis induced with Bact. monocytogenes. No reaction followed the inoculation. Six days later the same monkeys were again swabbed from a guinea-pig infected experimentally. In addition a previously untested monkey was similarly inoculated. Infection occurred in the latter animal only, and this consisted of a severe conjunctivitis appearing on the second day. There was injection, hyperemia, and edema of the lids with exudate. In addition, one eye showed hyphemia which lasted for about three days. It is felt, however, that the hyphemia was due to injury of unknown cause. The infection reached maximum severity on about the fourth or fifth day and disappeared by the twelfth day. Cultures of Bact. monocytogenes were isolated from the eye as late as the eighth day after infection.

In a final experiment three young monkeys were inoculated in one eye by swabbing and in the other by subconjunctival injection with a heavy suspension of Bact. monocytogenes No. 205. Infection did not develop in any of these animals.

The evidence indicates, therefore, that Bact. monocytogenes possesses a low-grade infectivity for the eyes of monkeys. Infection is induced only rarely and the reaction apparently remains limited to the conjunctiva.

Serial passage of Bact. monocytogenes from eye to eye

In order to determine whether the eye infection induced with Bact. monocytogenes is transmissible in series from animal to animal, a swab was rubbed lightly over the conjunctiva of infected guinea-pigs and then directly over the conjunctiva of normal guinea-pigs. In general, the transfer of material from the infected animal was made six to ten days after inoculation. Infection was readily transmitted to normal animals in this way for a series of eight transfers when the experiment was terminated. The infection appeared at intervals varying from three to five days and ran a course similar to that described above. There was no detectable alteration in the virulence of the organism in the course of this experiment.

Recovery of Bact. monocytogenes from infected animals

The course of the eye infection was followed by culture and by stains of conjunctival scrapings in a number of guinea-pigs. It was found that Bact. monocytogenes might be isolated both early and late during the course of the disease. Thus, it was recovered in pure culture as early as the second day and at a time when the eye appeared normal under gross examination. Moreover, the bacterium was isolated from one animal as late as the ninth day after inoculation or the fifth day after the onset of definite infection and from a second animal on the thirteenth day which was the ninth day of clinical disease. Direct smears, made early in the experiment, showed countless rods, morphologically like Bact. monocytogenes, most of them lying in the cytoplasm of the epithelial cells. As the reaction increased in intensity, more leucocytes were observed in the preparations but these contained the rods only occasionally. There appeared to be a definite migration of monocytes and these were found to contain the organisms also. As the acute reaction began to subside, only a few bacteria were found in the smears and these were often lying free.

Immunity following eye infection with Bact. monocytogenes

Eight guinea-pigs which had recovered from an eye infection with Bact. monocytogenes were tested for resistance to reinfection. These animals had been infected from one to five weeks previously in the right eye only. While the acute phases of the reaction had definitely disappeared, practically all of the animals still showed the "ground glass" cornea and some had fragmented vessels still visible. Both eyes of these animals were tested for increased resistance to reinfection. For purposes of control, use was made of five normal guinea-pigs and five other animals which had manifested no visible response to instillation of one eye with Bact. monocytogenes three weeks previously. In the case of the latter animals only the previously unused eye was tested.

All of the normal animals were infected and all developed pannus, while none of the eight eyes previously infected responded to the inoculation. When infection did occur in the opposite eye of the latter animals, it was definitely milder as shown by the smaller percentage developing pannus, and by the decreased duration of the disease. Even in the animals which had not become infected following previous instillation, there appeared to be a slight immunity as measured by the average duration of the infection.

Blood picture of animals infected in the eye with Bact. monocytogenes

Since as the name implies, one of the chief attributes of Bact. monocytogenes is its ability to stimulate a mononucleosis, several of the infected rabbits and guinea-pigs were studied to determine the influence of the eye infection on the total and differential blood count. The results of this study revealed that red cells were unaffected and that in general there was no significant nor regular change in the total white-cell count. Occasionally there was a definite rise in the total number of white cells with a marked increase in the monocytes. This change in blood picture was irregular, however, so that it was not possible to establish a correlation between eye infection and blood changes.

Histological changes of the eye during infection

In order to study the tissue changes associated with the ocular infection described above, the eyelids and eyeball were removed from a number of animals at different times during the course of infection. Examination of the tissues was made by Dr. Harvey D. Lamb of the Department of Ophthalmology. The following is a typical description of early infection in a guinea-pig one day after instillation of the organism:

"In the eyeball, the bulbar conjunctiva was very edematous but contained few infiltrating cells. Capillaries extended a very short distance into the cornea and the anterior lamellae were considerably edematous but showed practically no cellular infiltration. In the eyelids the conjunctiva of the lower lid was in general considerably edematous with very little cellular infiltration. The conjunctiva of the upper eyelid was also edematous and in addition showed infiltration with comparatively great numbers of pus and large mononuclear cells. In the superior fornix, the conjunctiva was markedly thickened by almost solid masses of large mononuclear cells. The surface epithelium was generally edematous and undergoing disintegration in both eyelids.

"In another guinea-pig on the sixth day after instillation of the organism, the eyeball showed a dense infiltration of the bulbar conjunctiva adjacent to the cornea with large mononuclear and plasma cells. Small capillaries extended into the cornea at all depths. The anterior lamellae of the cornea presented considerable edema, while between the corneal lamellae there was a diffuse, moderately dense infiltration of pus and large mononuclear cells. The corneal corpuscles, however, did not participate in the reaction. In the eyelids, the conjunctiva away from the lid margins and in the fornices was generally thickened by dense numbers of large mononuclear and plasma cells. In the upper eyelid, this thickening of the conjunctiva was particularly pronounced from massive

[illegible]ations of large mononuclear [illegible]rge mononuclear and pus cells [illegible]d generally the subconjunctiv[illegible]s of the lids to a moderate de[illegible]e surface epithelium of the con[illegible] of both eyelids was generally [illegible]ous, disintegrating, and infil[illegible] with pus cells in a greatly vary[illegible]gree."

That a similar change occurred in the eyes of infected rabbits is illustrated by the following description of a preparation made five days after inoculation. "In both eyeballs, the bulbar conjunctiva adjoining the cornea was very edematous, and had advanced considerably over the anterior surface of the cornea around its entire periphery. In this swollen bulbar conjunctiva, lay numerous large mononuclear cells and fewer numbers of small lymphocytes. Here were observed, also, numerous congested capillaries, which in many places revealed a proliferation of endothelial lining. The capillaries extended everywhere for a short distance between the superficial lamellae of the cornea propria. All parts of the cornea except its central portion showed infiltration with large mononuclear cells and small lymphocytes. Moderately dense at the periphery of the cornea, they gradually diminished in number toward the center of the cornea. This cellular infiltration was also more pronounced between the anterior lamellae of the cornea propria. The corneal corpuscles were unaffected."

From the preceding pathological descriptions it may be seen that definite pathological changes occurred as early as 24 hours after instillation of the culture. The most striking and characteristic sign of the infection was the mononuclear infiltration of the lids and of the cornea. It is interesting in this connection to point out the differences in the histological picture accompanying this infection with that associated with hypersensitiveness[6], since as pointed out above both conditions were clinically similar. In the latter instance there was no mononuclear infiltration and unlike the infection with Bact. monocytogenes, there was a marked proliferation of the corneal corpuscles.

Discussion

The experiments described in the present report indicate that Bact. monocytogenes possesses a unique infectivity for the eyes of guinea-pigs and, to a less extent, of rabbits and monkeys. Infection follows simple instillation of saline suspensions of culture and in this respect Bact. monocytogenes differs from most organisms which require a preliminary traumatization or actual injection in order to establish ocular symptoms. As exemplified in the guinea-pig, the experimental infection is characterized by an early, acute onset consisting eventually of conjunctivitis, exudate, clouding, and vascularization of the cornea. The condition attains maximum severity in about ten days and complete quiescense requires weeks. During the course of infection, the disease does not spread to the uninoculated eye. The organisms are demonstrable in smears and may be cultivated for a number of days after onset, which constitutes an unusual condition as compared with the more common, acute infections of the human eye, in which the infecting organisms disappear within two to four days.

Pathologically the infection is characterized by a massive infiltration of both conjunctiva and cornea with monocytes and by the appearance in the cornea of numerous congested capillaries which often undergo a proliferation of endothelial lining. Apparently, the corneal corpuscle plays no part in the reaction. A study of the blood changes during the infection reveals no constant nor uniform alteration of the blood-cell constituents. Occasionally, nevertheless, an animal presents a distinct mononucleosis.

It is possible to transmit the infection in series from eye to eye. While it has not been determined how long a local immunity may endure, it has nevertheless been shown that recovery from infection bestows a distinct resistance to subsequent reinoculation.

Conclusions

1. Bact. monocytogenes possesses a definite pathogenicity for the eyes of rabbits, guinea-pigs, and monkeys.

2. The infection induced by this organism is most severe in guinea-pigs and may be invoked by instillation of heavy suspensions into the conjunctival sac.

3. The infection in guinea-pigs and rabbits is characterized by a massive infiltration of the conjunctiva and cornea with mononuclear cells, and vascularization of the cornea. In the monkey the cornea is not involved.

4. There appear to be no differences in susceptibility to this ocular infection which are attributable to age.

5. The infection does not spread spontaneously from infected to normal eye.

6. In guinea-pigs, the disease is readily transmitted by swabbing from the conjunctiva of infected to normal animal.

7. The organism may be isolated from infected eyes as late as the ninth day after appearance of symptoms and is demonstrable in stained smears for several days.

8. While a definite monocytosis occasionally occurs in the blood during infection, changes in the blood picture cannot be correlated with the clinical course of the infection.

9. Recovery from infection apparently induces a state of local resistance to subsequent reinoculation.

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References

[1] Murray, E., Webb, R. A., and Swann, M. B. Jour. Path. and Bact., 1926, v. 29, p. 407.
[2] Pirie, J. H. H. Publ. South African Inst. for Med. Res., 1927, v. 3, p. 163.
[3] Nyfeldt, A. Compt. Rend. Soc. de Biol., 1929, v. 101, p. 590.
[4] Anton, W. Centralbl. f. Bakteriol., 1934, v. 131, p. 89.
[5] Julianelle, L. A., Morris, M.C., and Harrison, R. W. Amer. Jour. Ophth., 1933, v. 16, p. 962.
———. Jour. Immunol., 1934, v. 26, pp. 267, 295.
[6] Julianelle, L. A., and Lamb, H. D. Amer. Jour. Ophth., 1934, v. 17, p. 916.

MEGALOPHTHALMUS

Report of a Case

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The author discusses megalophthalmus and reports a complicated case successfully treated by refraction. A review of the literature is given, revealing the confusing terminology and questioned status of this disease. The characteristics of megalophthalmus are described with a differential diagnosis from buphthalmos. An attempt is made further to establish megalophthalmus as a definite disease entity. From the Department of Ophthalmology, University of Michigan.

Ophthalmologists, as a group, have been slow to recognize megalophthalmus as a disease entity. Many have considered megalocornea, macrocornea, megalophthalmus, keratoglobus, hydrophthalmos, and buphthalmos to be synonymous terms, suggesting that megalophthalmus is an arrested form of hydrophthalmos. I believe that the literature has presented sufficient evidence to establish the fact that megalophthalmus is a disease in itself and should be differentiated definitely from buphthalmos, hydrophthalmos or infantile glaucoma and not confused with it.

Although cases had been reported similar to megalophthalmus prior to 1889, it was not until that year that Horner and Michel[1] definitely differentiated a disease called "keratoglobus pellucidus" from "keratoglobus turbidus." They noted that it occurred in multiple members of the same family, that there was a definite increase in the size of the cornea with no evident deficiency in the eye as an ocular instrument, and that there was a tendency toward the development of cataracts in later life.

Harlan[2], in 1898, reported a case of keratoglobus. He mentioned that textbooks of that time discussed it as an incident of buphthalmos but believed that it could not be classified with congenital hydrophthalmia or buphthalmos.

In 1917, the American Encyclopedia of Ophthalmology[3] stated that megalocornea, megalophthalmus, and keratoglobus meant true enlargement of the cornea or globe without other accompanying departures from the normal, while hydrophthalmos or buphthalmos meant enlargement secondary to some previously diseased condition or anatomical defect.

De Schweinitz[4], in 1924, considered hydrophthalmos, keratoglobus, megalocornea, and buphthalmos as synonymous and made no mention of a differentiation of megalophthalmus as a separate disease.

Ball[5], in 1927, differentiated megalocornea from hydrophthalmos, stating that megalocornea shows no signs of internal disorganization and no excavation of the optic nerve, and that there is usually good vision; whereas in hydrophthalmos there is excavation of the nerve head, internal disorganization of the eye, and loss of vision.

Parsons[6], in 1931, stated that keratoglobus is a hemispherical protrusion

Figure 1 (Davies). Megalophthalmus.

of the whole cornea which is met with in infantile glaucoma. He mentioned no differentiation between megalophthalmus and buphthalmos.

Vail[7], in 1931, completely reviewed the literature, definitely establishing megalophthalmus as a disease entity.

The etiology of megalophthalmus is still in considerable dispute. The evidence at this time, however, seems to favor the theory that the condition is an atavistic one, manifesting itself as an hereditary hyperplasia of the cornea, involving the anterior segment of the eye, which may be followed by diseased processes resulting in dislocation of the lens, and so forth.

Vail described the characteristics of megalophthalmus, dividing them into major and minor signs, of which the major signs were: (1) enlarged transparent corneas varying from 12.5 to 18 mm. in diameter, (2) presence of a familial incidence in which the heredity manifests itself as a recessive, sex-linked character, being transmitted from females to males, (3) always bilateral, (4) almost exclusively limited to the male sex, (5) no evidence of glaucoma; and the minor signs were: (1) deep anterior chambers, (2) iridodonesis, (3) atrophy of the stroma of the iris and miosis due to atrophy of the dilator muscle, (4) embryotoxon or gerontoxon, (5) dislocated or tremulous lens, frequently cataractous, (6) melanosis cornea, (7) presence of visible nerve fibers in the corneal stroma, (8) remains of pupillary membrane, (9) sharply defined sclerocorneal margin.

To differentiate buphthalmos from megalophthalmus, buphthalmos is characterized by: (1) increased intraocular tension, (2) subnormal vision, (3) cupping of the optic nerve, (4) increase in size of the eye in all diameters, (5) fissures in Descemet's membrane, (6) presence of corneal opacities, (7) bluish appearance of the sclera, (8) loss of the definite line of demarcation between cornea and sclera, (9) the usual absence of miosis, (10) its rarity as a familial occurrence, (11) the possibility of unilateral manifestation, (12) being nearly as common in females as in males.

Concerning the treatment of choice in megalophthalmus: (1) with no complications and good vision, the refractive error should be corrected if necessary; (2) if cataracts are present, they may be extracted, but a guarded prognosis should be given due to the tendency toward vitreous loss during operation and to the incidence of detachment of the retina following operation; (3) if dislocation of the lens is present, the treatment of choice is refraction of the aphakic portion of the pupil with warning to the patient that should the eye become painful or red it should receive immediate attention, at which time operative procedures may be adopted.

Case report. E. G., male, white, age 66 years, presented himself at the University Hospital with the following history: Vision had begun to fail in the left eye 13 years ago, and within a year was no longer useful. The right eye began to fail 18 months ago becoming no longer useful one year ago. About eleven months ago, he stated, "the cloud before the left eye began to settle gradually and in four months had completely disappeared below." Since that time his vision had been fair with the left eye but he had been unable to read. When questioned further he remarked that his vision had always been good until the onset of the present illness; that he was aware that his eyes were larger than other people's; and that he had two maternal uncles whose eyes were large like his own.

Examination revealed the following: vision 3/60 in the left and 1/60 in the right eye. The left cornea was 14 mm. the right 13 mm. in diameter. There was marked arcus senilis, but no corneal scars nor evidence of ruptures in Descemet's membrane were apparent. Other findings were: definite corneoscleral margin, anterior chambers very deep, atrophic iris, iridodonesis, pupils very small, and tension 16 in both eyes by the Schiötz tonometer. There was no evidence of target reflex.

Ophthalmoscopic examination revealed the lens in the left eye to be luxated directly downwards, with definite cataractous changes. The fundus

was normal in this eye. The lens in the right eye was cataractous and fundus details could not be made out.

This case was diagnosed as megalophthalmus with associated bilateral cataracts, the one on the left being luxated downwards.

The patient's refraction was tested through the aphakic portion of the left eye, the correction reading + 9.50 D. sph. ⊂ + 0.50 D. cyl. axis 100°, resulting in 6/6 vision. With the addition of a plus 3.00 D. sphere the patient read Jaeger No. 1 with ease.

The patient was discharged with the warning that if the left eye should become painful or red he should return immediately to the hospital. A check-up three months later revealed the correction to be the same with no change in the visual acuity.

References

[1] Horner, and Michel. Die Krankheiten des Auges im Kindesalter. In Gerhardt's Handbuch der Kinderheilkrankheiten. Tübingen, H. Laupp, 1889, v. 5; cited by Vail.

[2] Harlan, G. C. A case of keratoglobus. Arch. of Ophth., 1898, v. 27, p. 199.

[3] American Encyclopedia of Ophthalmology. Chicago, Cleveland Press, 1914, v. 4, p. 2829; 1917, v. 10, p. 7626.

[4] de Schweinitz, G. E. Diseases of the eye. Ed. 10, Philadelphia, W. B. Saunders Company, 1924.

[5] Ball, J. M. Modern ophthalmology. Philadelphia, F. A. Davis Co., 1927, v. 1, p. 441.

[6] Parsons, J. H. Diseases of the eye. Ed. 6, New York, Macmillan Co., 1931.

[7] Vail, D. T., Jr. Adult hereditary anterior megalophthalmus sine glaucoma; A definite disease entity. Arch of Ophth., 1931, July, v. 6, p. 39.

THE AGING LENS

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In this article the author compares the two main forms in which physical changes are manifest within the lens. These are nuclear sclerosis and cortical intumescence. A gradual development of nuclear sclerosis with a related concomitant hardening of the cortex takes place throughout life.

This physiological sclerosis may go to excess and cause a moderate clouding and some lowering of the visual acuity. Sclerosis may inhibit the other senile tendency, that of cortical intumescence as manifested by radial-spoke formation and lamellar separation. Progression of cortical changes may thus be permanently inhibited. Cortical changes which will remain stationary and those which may eventually progress may be sharply differentiated with the slitlamp. Read before the Chicago Ophthalmological Society, October 15, 1934.

The gradual sclerosing that takes place within the lens nucleus and cortical substance throughout life is much more than just presbyopia. Its degree and character destine the type of senile cataract that may develop.

Lens sclerosis presents an interesting study, for it may be well observed and analyzed under intense illumination.

The gradual hardening of the lens substance may be considered as within physiological bounds if the lens remains relatively clear in old age.

This process of slow sclerosis, which involves the lens substance *in toto*, is spoken of as presbyopia in its earlier stages. During life an increase of the refractive index within the nuclear area develops. The increased refraction thus obtained is neutralized by the gradual flattening of the lens antero-posteriorly, due to the divergence of the newer cortical lamellae toward the equator. Thus the total refraction of the lens is kept in an approximate balance throughout life.

In middle life and old age, the opaque nuclear area may be sharply differentiated from the cortex along a definite concentric band. This nuclear zone is clearly outlined and is situated one lamellar step under or within the adult nuclear band. The latter is within the cortex and presents the well-known characteristic surface reflex. The extensions of sclerosis into the cortex is in step with that of the nucleus, though not necessarily visible by changes in the illuminating beam.

The statement found in textbooks that in senile cataract the lens may become all nucleus, is not wholly true. A differentiation of the cortical areas, unless these are in a state of intumescence, is always possible.

If sclerosis, manifested by an opaque nucleus in intense illumination, goes to excess, it may result in a relatively low degree of clouding and a corresponding lowering of the visual acuity. This is one type of senile cataract, and as such may be called *nuclear sclerosis*.

An excess of sclerosis within the nucleus may develop an imbalance in refraction. The greatly increased refractive indices of the nuclear elements bring on an increase in the refraction. This change in the direction of a myopia is called "second sight." The refractive changes in second sight are gradual and permanent as attained. They should be promptly measured and corrected by corresponding changes in lenses. That the process is a sclerosis is also proved by the fact that a slight degree of clouding is concomitant. This may lower the visual acuity to a small degree.

A certain degree of yellowing of the nucleus may accompany nuclear sclerosis. In many instances this yellowing may go to excess, and the nucleus within these lenses will become red, dark red, and almost black (cataracta nigra) in extreme cases. The area involved again is limited to a sharply circumscribed zone, one concentric step under and within the adult nucleus. The nature of this process is not understood. It must express a pathological variant, and is very often influenced by local conditions within the eye, such as we see in cataracta complicata. The latter toxic change is often seen in conjunc-

tion with a red nucleus. Quite often the nucleus is so dense and dark red that it obscures the deeply seated cataracta complicata when viewed with the slit-lamp. The diagnosis of the posterior subcapsular changes in these instances is then possible by means of the ophthalmoscope because of its reduced magnification and low intensity of light. That an advanced reddening of the nucleus is pathological is proved by its frequently unilateral occurrence.

Two tendencies, opposite in their results, may be observed in the aging lens. They are sclerosis of the nucleus and cortex on the one hand, and intumescence on the other. If either is present it betokens and discloses the possible future fate in respect to the retention of lens transparency. Irrespective of chemical and biological factors, as yet undisclosed, these two very evident diverse mechanical changes exclude and in a way inhibit one another in their respective developmental progression.

Either process, if unhindered in its progress, may ultimately lead to more or less clouding of the lens. This is especially true of intumescence of the cortex if not inhibited by sclerosis. A cortical cataract will then develop. At times its progress may be stormy, after intumescence has attained a certain stage. If sclerosis of the aging lens obtains an early supremacy, it no doubt presents the normal process of conservation and is a relative protection against partial blindness. The development of cortical cataract is then impossible.

Cortical cataract, intumescence and disintegration of the cortex, presents an interesting study under intense illumination, especially when viewed with the very narrow beam. In its incipience a watery fluid forces the cortical lens structures apart. Separation may occur in a radial-spoke direction, either along the sutures, or, more often, along the radial lamellae of Rabl. The latter present over 2,000 potential linear radial lines of cleavage—any one of which may form a radial water slit or spoke. Incipient lamellar clefts within the cortex may also be easily observed. These present areas of fine, parallel, wavy lines at right angles to the direction of the fiber. These concentric clefts never follow definite anatomic lines. The concentric layers of individual fibers are so very thin that a large series may be involved to form a concentric cleft. The successive crossings over of the thin individual layers within the cleft produce the parallel, combedlike, wavy lines so distinctly seen in the area of the lesion. If the process of disintegration of the cortex is active, both radial and lamellar separation may coexist.

Cortical intumescence or disintegration, if well advanced, may at times develop a very stormy progression—a rapid ripening of the cataract. As a rule, however, the process is quite slow and may apparently be at a standstill for many years. Incipient lesions are invisible with the ophthalmoscope. The seemingly optically void black fluid spaces, as best seen with the narrow beam, may remain unchanged for very many years. Ultimately the water will disappear and the walls of the cleft will then become opaque and visible with the ophthalmoscope as well as in good focal light.

If incipient water clefts are not found by careful examination—all lesions being gray and opaque—a healed cataract may be diagnosed. In these fairly common cases the slowly increasing sclerosis of the total lens substance has definitely eliminated any possibility of the development of further intumescence. The grayish cloudings found within these lenses may have been unchanged for many years or decades. This is due to the sclerosis which has greatly progressed during these years. An immunity to further lens opacification because of senile cataract may be safely anticipated in these cases, and so prognosticated.

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CONJUNCTIVAL MYIASIS

Due to the Sheep Gadfly, *Oestrus ovis*

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Report of case of man struck in eye by insect. Within the next ten hours 10 first-stage larvae of Oestrus ovis were removed. One additional larva was seen to disappear down the lacrimal duct. The larvae caused mechanical irritation of the conjunctiva. No sequelae had developed after two-and-a-half months. The accident is probably much more common than is recognized. It is suggested that the conjunctiva and lacrimal duct may be one of the normal modes of parasitizing animals. Read before the American Society of Parasitologists and the American Association for the Advancement of Science, in Pittsburgh, December 27 to 29, 1934.

Conjunctival myiasis, due to larvae of the sheep gadfly, is probably a trivial accident to the human eye, and occurs very much more frequently than accounts in the literature or statements in standard textbooks of ophthalmology and parasitology would indicate.

The condition is caused by the deposition in the conjunctival sac of the minute living larvae of *Oestrus ovis*. This fly is a natural parasite of sheep. The first-stage larvae, scarcely a millimeter in length, are deposited by the viviparous females in summer or autumn in lots of five to 50 in the nostrils and, no doubt, eyes of sheep. From these places they make their way to the frontal sinuses, and during the winter develop into maggots of considerable size, 20 to 30 millimeters in length. With the advent of spring and summer the larvae emerge from the nose, fall to the ground into which they burrow, and there pupate for 25 to 50 days, when adult flies hatch out. These mate and the pregnant females infest sheep again. At times, when occurring in large numbers[1, 2, 3, 4, 5, 6, 7], these flies are a serious menace to sheep. When other animals, such as man or dogs, are attacked, the larvae cause mechanical irritation which may last up to ten days, after which the larvae apparently die for want of suitable soil. The minute larvae are deposited as the fly strikes the eye or other object aimed at, in a second or less.

The accident of these larvae getting into human eyes seems fairly common in Russia[8] and Algeria[8], less frequent in western Europe[9] and rare in the United States as judged by the literature. I have found but three cases reported for this country (Bedsole and Neal 2 patients; Stark)[10, 11]. However, being struck in the eye by a fly cannot be considered as unusual, and the resulting conjunctival irritation is probably

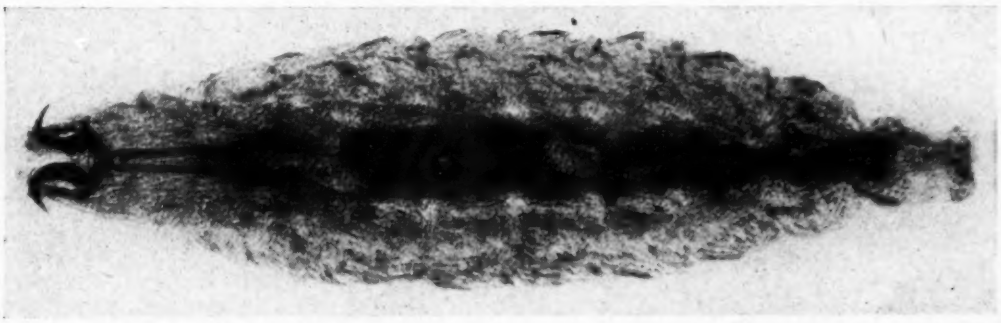

Fig. 1. Photomicrograph of 10-hour-old larva of *Oetsrus ovis* removed from a human conjunctival sac, ×125. Owing to the clearing action of the balsam the numerous chitinous hairs or bristles of the body are not very apparent, nor is the circlet of hooklets about the anus. The dark spot in the center of the body is a mass of cell nuclei not seen in unstained preparations. The specimen was stained in acid carmine, dehydrated in alcohol, cleared in xylol, and mounted in balsam. It is now part of the parasite collection of the United States National Museum, No. 40222.

looked upon as a result of the blow of the fly, and the small maggots are not searched for and soon wander down the tear duct or are washed out of the eye. I have found no reports of these larvae penetrating the eyeball or causing serious damage to the nasal passages, for man is not the natural host.

Fig. 2. Adult Sheep Gadfly, *Oestrus ovis*, enlarged about five times. Courtesy of Zoological Division of the Bureau of Animal Industry.

The parasites in this case were sent to Dr. E. W. Price, Parasitologist in charge, Miscellaneous Parasite Investigations, Bureau of Animal Industry, United States Department of Agriculture, who wrote in a letter dated October 9, 1934, ". . . the larvae which were obtained from the eye of a man have been examined by Mr. Allen McIntosh of this Division and found to compare in every detail with the description of the first-stage larvae of *Oestrus ovis*, as given by Porchinsky in his paper, *Oestrus ovis*, its history, characteristics, methods of control, and relationship to man. Mr. McIntosh's identification has been confirmed by Dr. F. C. Bishopp of the Bureau of Entomology. Infections such as you report are not rare, but relatively uncommon. . . ."

A photomicrograph of the parasite is here reproduced. The long sharp hooks on the anterior end of the animal explain why the parasite causes so much irritation as it crawls over the surface of the conjunctiva.

The treatment consists in removing the larvae with cotton on a small applicator, under rather high magnification of a simple microscope. They are too small to be removed with forceps, those in the present case being slightly under a millimeter in length. The modern binocular giving magnification ×10 and an unusually long working distance would appear to be ideal. This binocular is a part of the slitlamp of ophthalmologists. It is probable that in the course of a few days most of the larvae would spontaneously work out of the eye or crawl down the tear duct, and finding man to be an unsuitable host would eventually die.

Case report

Mr. H.M., aged 27 years, was seen as an emergency patient on September 11, 1934. He is employed by a tire company and works mostly out of doors in South Bend, and not in the country. At ten o'clock in the morning while standing up he was struck in the eye by some insect. His fellow workers examined the eye and saw nothing in it. At 1:30 o'clock he called at the office of an ophthalmologist who was out of town. His nurse examined the eye and found nothing in it and put in mercurochrome. I was asked to see the eye as an emergency, and did so at 4:00 p.m.

The usual examination of the eye revealed nothing except a reddened conjunctiva. The patient was so insistent that something was in his eye that I carefully examined it with a Zeiss aplanatic pocket lens magnifying ten diameters, and was astonished to see in the lower conjunctival fold a small actively moving larva, most of it whitish in color and scarcely visible, but with the anterior third distinguished by the dark-brown chitinous hooks and accessory apparatus shown in the photomicrograph. The larva advanced by the usual looping movement of a caterpillar, placing the hooks into the conjunctiva and then pulling itself forward, releasing the hook-hold, shoving itself forward by extension, and so on. It traveled at an estimated rate of possibly two or three millimeters per second. This larva was successfully removed with cotton on an applicator and placed in alcohol.

The patient still insisted that he had

more objects in his eye and continued examination revealed at least six others, which were removed in the same manner. By that time the patient was tired and his eye somewhat painful from the irritation of the cotton applicators and larval hooks, and a drop of cocaine solution was instilled. After that he felt no more larvae. The patient could always tell when and in what part of the conjunctiva the larvae were moving and whether each attempt at removal had been successful or otherwise.

Knowing the possible dangers of fly larvae in the eye, I cautioned the patient that if he felt any more during the evening he was to be sure to report again. At 8:30 o'clock, after the effects of the cocaine had worn off, the patient called and said he could still feel larvae crawling in his eye. At this time four were found in the conjunctival folds, three of which were removed and placed in alcohol; the fourth escaped down the lacrimal duct.

After removal of the last larva the patient said he felt no more moving about in his eye, and it was concluded that all had been taken out. Some holocaine and epinephrine ointment was placed in the conjunctival sac.

The patient used more of this ointment the next morning at eight o'clock and saw me for final examination at noon. He felt no more larvae, and careful inspection of the conjunctival sac with a hand lens revealed no more parasites. Since that time the patient has felt perfectly well and so far has experienced no discomfort of the nose nor tear duct, indicating that none of the larvae were growing therein.

Summary

A case of sheep-gadfly larvae in the conjunctival sac is described. Such cases are probably more numerous than the literature indicates, because of their probable trivial nature and the failure to see the larvae because of their small size. Patients complaining of foreign bodies in the eye should have the eye carefully examined by a lens magnifying at least ten diameters. Treatment consists in the mechanical removal of the larvae. The use of cocaine is contraindicated because it deadens the patient's sensibility to the presence of the larvae.

References

[1] Braun, M., and Seifert, O. Die tierischen Parasiten des Menschen. Ed. 6, Leipzig, Kurt Kabitzsch, 1925, v. 1, pp. 486-487.
[2] Brumpt, E. Précis de parasitologie. Ed. 4, Paris, Masson et Cie, 1927, pp. 1043-1044, figures 578-579.
[3] Herms, W. B. Medical and veterinary entomology. New York, The Macmillan Company, 1915, pp. 255-257, figures 163-164.
[4] Neveu-Lemaire, M. Parasitologie des animaux domestiques. Paris, J. Lamarre et Cie, 1912, pp. 665-668.
[5] Portchinsky, J. A. *Oestrus ovis* L. its life history and habits, the methods of combating it and its relation to human beings. (Russian) Abstract in Rev. of Appl. Entom., Ser. B, 1913, v. 1, pp. 134-137.
[6] Raillet, A. Traité de zoologie médical. Ed. 2, Paris, Asselin et Houzeau, 1895, pp. 761-765, figures 519-522.
[7] Riley, W. A., and Johansen, O. A. Handbook of medical entomology. Ithaca, Comstock Publishing Co., 1915, pp. 113-114.
[8] Sergent, Edmond, and Sergent, Étienne. La "Thim'ni" myiase humaine d'Algérie. Ann. Inst. Pasteur, 1907, v. 21, pp. 392-399.
[9] Larrousse, F. La myiase oculaire à *Oestrus ovis* L. dans la région parisienne. Bull. Soc. Path. Exotique, 1921, v. 14, pp. 595-601.
[10] Bedsole, J. G., and Neal, R. D. Ophthalmomyiasis. Trans. Med. Assoc. Alabama, 1930, v. 63, pp. 253-255.
[11] Stark, H. H. Ophthalmia myiasis externa due to larvae of *Oestrus ovis*. Jour. Amer. Med. Assoc., 1923, v. 81, pp. 1684-1685, figures 1 and 2.

PARTIAL DETACHMENT OF THE RETINA TREATED SUCCESSFULLY WITH SHAHAN'S THERMOPHORE

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This is probably the first report of the use of the Shahan thermophore in a selected case of detachment of the retina. The outcome was entirely successful, reattachment having persisted for nine weeks, when the report was made.

It has always been obvious that in detachment of the retina anything that would bring about an adhesion between the detached membrane and the underlying choroid offered the possibility of a restoration to normal conditions. Injections of irritating substances, such as iodine, cauterization of the sclera, and electrolysis were all tried with no great success, probably because no one was persistent enough in the endeavor. It was not until Gonin made his work public that interest in this and other methods, was sufficiently aroused to cause continued effort along this line. Since Gonin's work, we have had Guist and Lindner's chemical cauterization, Safar's electrolysis, as well as other methods. All have been more or less successful.

It had seemed to the writer that Shahan's thermophore might be of use, provided the retinal detachment was not very great in extent; but a suitable case did not offer itself for trial of this method until recently.

Post, in the Transactions of the American Ophthalmological Society, for 1924, gave some very interesting information as to the effect on the eyeball of an application of heat with Shahan's thermophore at different temperatures and for different durations of time. He reported that an application for one minute at a temperature of 160° produced a definite reaction in the sclera and the underlying choroid. The sclera would become brittle so that brisk rubbing would remove particles of it and there would be definite swelling and pigment changes in the choroid.

In the American Journal of Ophthalmology for August, 1934, Dr. John M. Wheeler suggested that possibly the thermophore should be one of the most satisfactory methods for producing a reaction in the discs in detachment of the retina. He had previously, however, made this suggestion at a meeting of the American Academy of Ophthalmology and Otalaryngology.

In an editorial in the American Journal of Ophthalmology, Dr. W. H. Crisp also expressed the belief that the thermophore should be useful in this condition. Apparently neither Wheeler nor Crisp had, up to the time of their writing, put this theory into practice.

The patient whose condition is here recorded is Mr. D. J. C., who was first seen in August, 1919, at which time he was 22 years of age. He had noticed for about eight months that the vision of the right eye was blurred, but he had had no pain and had not sought medical advice. He had enlisted in the naval reserve in August, 1917, and at that time his vision was tested and found to be normal. In January, 1919, he was placed on inactive duty but his vision had not been tested.

Examination showed that the right pupil was larger than the left and was sluggish to light; the vision of the right eye was 1/60, that of the left, 6/5. The interior of the right eye showed a rather pale disc, the media being clear, and a detachment of the lower outer portion of the retina. The field of vision was concentrically cut with the exception of the upper nasal portion, which was almost entirely lost. The highest portion of the detached retina was seen with a +12D. Transillumination was good in all parts of the globe. The left eye showed no abnormalities. His physician reported his general condition to be good. He was seen twice more. On account of the length of time which had elapsed since the poor vision was first noticed, a poor prognosis was given. During his naval service he had boxed

a great deal and it was believed that the detachment of the retina was probably the result of a blow.

He was not seen again until September, 1927, when he gave a history that for about a month the vision of the left eye had been blurred; at this time the vision of the right eye was still 1/60 with, however, much more of the retina detached and considerable haze in the lens and vitreous. In the lower outer portion of the left fundus there was a partial detachment of the retina, elevated about 5D. The central vision was 5/10, with quite a cut in the upper nasal field.

On the 30th of September he was seen by Dr. T. B. Holloway in consultation, who agreed that he should be hospitalized. This was done; he was placed on a treatment of sweats, sodium iodide, and subconjunctival salt injections. Later it was noticed that some opacities had appeared in the vitreous of the left eye, but no tear in the retina was seen at any time. Physical examination showed that he had several teeth with bad root abscesses and that his tonsils were badly infected. The teeth were extracted, the tonsils were removed, and the eye gradually improved, until on November 25 he was discharged with a retina well in place and a vision of 5/9 partly.

He had been under periodic observation since then, the eye remaining in good condition until August, 1934, when it was discovered that there was a detachment of the retina in the lower outer portion of the globe, the greatest elevation being seen with a +12D. He was sent to the Presbyterian Hospital at once and on August 26 a sclerotomy was done followed by a treatment with Shahan's thermophore, the application to the sclera being one minute at a temperature of 160°. Both eyes were bandaged and the dressing was not changed for forty-eight hours, when the retina was found to be in place. The eye was kept bandaged until September 4, when the bandage was removed, the retina still being in place. It remained so until September 10, when it was again found to be elevated, the detachment being about as at first. On September 11 a second sclerotomy was performed and another application of the thermophore made, the temperature this time being 165°. The reaction was greater than after the previous operation and the bandage was kept on somewhat longer, not being removed until September 24, when a stenopeic slit was placed before the left eye. Recovery was uneventful, the field returning to normal and vision returning to 5/9 partly, where it still remains.

This case represents probably the ideal condition for the use of Shahan's thermophore in detachment of the retina. It seems doubtful if it could be successfully used if separation of the retina from its underlying parts were extensive. There seems to be no question that a more definite amount of irritation can be produced by this instrument than by any of the other methods, with the possible exception of Safar's electrodes. When a large detachment of the retina is present Safar's method is probably more likely to achieve a satisfactory result, especially in dealing with conditions in the posterior portion of the globe, as the thermophore is too large in its present form to permit a satisfactory attack against the tissues back of the equator. Some alteration of the detachable parts of the thermophore will be necessary so that contact can be made more readily in this portion of the eyeball.

It is probable that this is the first report of the use of the thermophore in detachment of the retina and so far the result is all that could be desired. The application was done with local anesthesia and was readily borne by the patient. The reaction was not great and yet was apparently sufficient to bring about a good adhesion between the choroid and the retina.

1530 Locust Street.

PRIMARY CARCINOMA OF THE MEIBOMIAN GLAND

JAMES E. LEBENSOHN, M.D.
CHICAGO

The case reported of primary carcinoma of the Meibomian gland is quite typical. As usual the nature of the chalazionlike tumor had not been recognized, and it was the repeated recurrence that prompted a histologic examination. The treatment, consisting of wide excision, plastic repair, and radium therapy thereafter, achieved a very satisfactory cosmetic, functional, and therapeutic result. From the Department of Ophthalmology, Northwestern University Medical School. Read before the Chicago Ophthalmological Society, October 15, 1934.

Tumors of the eyelids, apart from chalazion, are as rare as chalazia are frequent, and consequently it is not surprising that the various neoplasms of the tarsal glands as well as the other proliferations in this area—as Jaensch[1] points out—such as tubercle, gumma, sarcoma, and nevus carcinoma have been generally confused with chalazion and so treated.

Neoplasms of the Meibomian gland, though unusual, still outnumber those arising from the other palpebral glands. Adenoma and carcinoma occur in about equal proportions. The total number of both reached 30 in 1913[2], and 40 in 1922[3]. As regards particularly Meibomian-gland cancer, there were on record 8 cases in 1904[4], 21 cases in 1920[5], and 48 cases in 1930[6]. Additional reports since[7, 8, 9] together with this presentation bring to a total of 52 the cases listed to date.

In accord with the customary incidence of carcinoma, the patients affected have usually been over 40 years of age, though an undoubted case has occurred as early as at 11 years[4]. Before 40, most neoplasms of the Meibomian gland are adenomata, but after 40 carcinomata preponderate. Transitional forms have been noted. Curiously, though lid cancer has a predilection for the lower lid, both forms of Meibomian neoplasm are found in the upper lid twice as frequently as in the lower.

Meibomian-gland cancer is a type of skin-gland cancer, and shares the general characteristic of being relatively benign in its early evolution. The growth first progresses with extreme slowness, without local reaction or lymphatic involvement, and does not attain a noticeable size for about a year. However, once the mass is curetted or otherwise incompletely operated upon, the course of the lesion changes dramatically to that of active malignancy, marked by quick recurrences, followed — unless adequately controlled — by progressive extension through the lid, rapid orbital involvement, and death. Of sixteen cases collected by Riva[3] in 1922, five thus ended fatally. The reports of Snell[10], Cavara[5], and Shoji[11] vividly exemplify the dangerous potentialities of this lesion, and further emphasize the responsibility of the ophthalmologist who happens upon this condition.

In an early case the diagnosis might be suspected when one notes, in an individual of middle age or over, an indolent painless chalazionlike tumor of cartilaginous consistency, with a bossy appearance on the conjunctival surface, and without any present or past inflammatory reaction. With the possibility of neoplasm in mind, the tumor should be enucleated and the tissue submitted to histological investigation.

The more advanced case presents a distinctive clinical picture. The firm mass appears well encapsulated, and moves freely underneath the skin, but is intimately fused both with the tarsus and the lid margin. The skin at the affected lid margin is atrophic, and the cilia of the region are scanty or gone. The lid edge is puffy or protruding, and the adjoining conjunctival surface is thickened, red, irregular, and ulcerated. The lymph glands are only occasionally involved.

Meibomian-gland cancer is a type of adenocarcinoma. Microscopically, the tumor consists of a large epithelial mass, surrounded by connective-tissue lamellae, and separated into lobules by connective-tissue septa. About the cen-

tral mass may be found tumor-cell nests, and here and there accumulations of small round cells.

The tumor cells are aggregated in alveolar formations which reach twenty to thirty times the size of normal acini. The cells in the alveolar periphery are smaller and more regularly arranged than those in the center. Shoji[11], pointed out that two types of cells are distinguishable, probably based on a difference of age. The more primitive cells have large nuclei, frequently in mitosis, and scanty cytoplasm; while the more differentiated cells have small nuclei and an abundant cytoplasm filled with fatty granules. These fatty granules are seen as vacuoles in alcohol-ether preparations, and in frozen sections stain orange-red with sudan III and violet-red with Nile blue. With polarized light they can be identified as cholesterin esters. These sebaceous cells tend to undergo fatty degeneration and form in the center of the alveoli amorphous masses. Capillaries enter the lobules and about them the primitive cells frequently gather in rosettes.

Exceptionally, as in the case of Imatomi[11], the epithelioma consisted of pavement calls (probably originating from the duct of the gland), while in a case reported by Fuchs[2] prickle-cells were observed.

The treatment is essentially surgical, and the intervention indicated depends on the involvement present. Fortunately, in most patients seen the lesion is confined to the lid and the lymphatic glands are not affected. In such cases a radical excision with a suitable lid plastic, followed by irradiation, generally assures a favorable prognosis.

Case report. A Polish woman, aged 43 years, in excellent general health, visited the Illinois Eye and Ear Infirmary May 21, 1932, because of a small lump in the outer third of the left upper eyelid. A year previously the growth, at that time the size of a pea, was curetted, and recurred two months later. Since then it had been operated on twice, always with recurrence. The vision in each eye was normal.

At the Infirmary the growth was conservatively excised by a member of the staff and sent to Dr. Georgiana Theobald for pathological diagnosis. After receiving a report of malignancy, the surgeon treated the lesion with diathermy and observed no recurrence during the following month of observation.

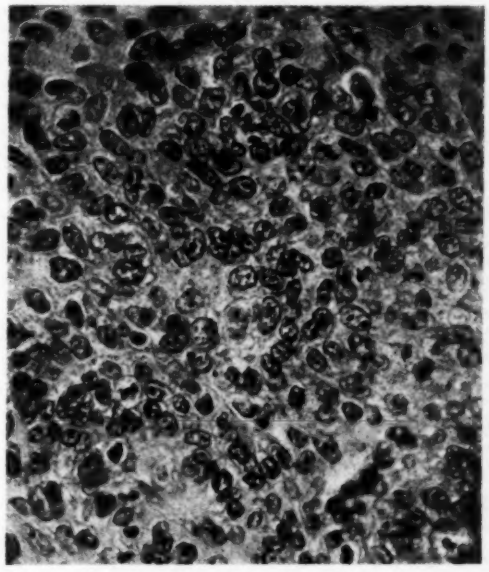

Fig. 1 (Lebensohn). Primary carcinoma of the Meibomian gland. Microphotograph of section (× 465). Numerous mitotic figures are evident.

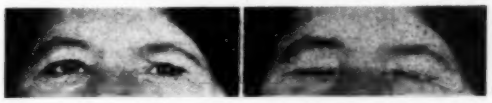

Fig. 2 (Lebensohn). Patient in whom the outer third of the left upper lid was removed for primary carcinoma of the Meibomian gland, showing the result of the lid plastic, and subsequent interstitial irradiation, four months after operation.

On March 20, 1934, the patient reported again at the Infirmary, this time with the growth occupying the outer third of the lid. The mass appeared well circumscribed, but intimately attached to the lid edge and the underlying tarsus. The overlying skin was freely movable, but the conjunctival surface was ulcerated and presented fungoid excrescences, especially at the palpebral border. The lymphatic glands were uninvolved. The diagnosis of carcinoma of the Meibomian gland was made

on the basis of these findings, the previous history, and the pathological report.

Before attempting excision of the growth, the healthy inner half of the lid was prepared for a sliding plastic, as described by J. E. Sheehan[12]. Through a vertical incision near the nasal attachment of the lid, the tarsus was separated from the overlying tissue. Into this cleft was inserted a stent covered on both sides by a Thiersch graft with its raw surface outward. A thin slice of cartilage obtained from the ear was then placed over the distal end of the stent, and the wound sutured. Two weeks later the involved area with a margin of apparently healthy tissue was excised. The stent was removed, and the healthy portion of the lid divided into two halves through the gray line at the lid edge. The upper half, having normal skin for covering, the cartilage implant for support, and the Thiersch graft for lining, was swung over to take the place of the excised tissue. That portion of the Thiersch graft which covered the area of overlapping was removed from both upper and lower halves. Healing progressed uneventfully at first, but a month later an excrescence at the lid margin was noted. The patient was thereupon referred to Dr. Max Cutler of the Tumor Clinic, Michael Reese Hospital, for radium therapy, and I want to take this opportunity to thank him for his kind coöperation. Interstitial radiation was given for forty-eight hours through two needles each containing one milligram of radium, filtered through one-half millimeter of platinum. With this single treatment, the tendency to recurrence completely regressed, and, except for a slight shortening in width, the lid regained a fairly normal appearance and function. Four months later, September 15, 1934, Dr. Cutler treated the lid again with interstitial radiation as a means of further prophylaxis.

The pathologic picture presented essentially the characteristics already described. A noteworthy feature was the extraordinary number of mitotic cells.

310 S. Michigan Avenue.

References

[1] Jaensch, P. A. Bösartige Geschwülste unter dem Bilde von Hagelkörnern. Klin. Monatsbl. f. Augenh., 1933, v. 90, p. 598.

[2] Scheerer, R. Ein Beitrag zur Kenntnis der Geschwülste der Meibomschen Drüsen. Klin. Monatsbl. f. Augenh., 1914, v. 52, p. 86.

[3] Riva, G. Epitelioma delle ghiandole Meibomiane. Arch. di ottal., 1922, v. 29, p. 261.

[4] Lagrange, F. Traité des tumeurs de l'oeil. Paris, Steinheil, 1904, v. 2, p. 733.

[5] Cavara, V. L'epitelioma primitivo delle ghiandole di Meibomio. Arch. per le sci. med., 1920, v. 43, p. 1.

[6] Lazarescu, D., Lazarescu, E., and Ionescu, E. A case of epithelioma of the Meibomian glands. Brit. Jour. Ophth., 1930, v. 14, p. 588.

[7] Chaillous, J., and Kalt, M. Tumeur meibomienne récedivante. Bull. Soc. Opht., Paris, 1931, p. 771.

[8] Nastri F. Epitelioma meibomiano diffuso. Zentralbl. f. ges. Ophth., 1931, v. 28, p. 647.

[9] Hughes, C. A. Multiple chalazia showing malignancy. Trans. Ophth. Soc. U. Kingdom, 1932, v. 52, p. 557.

[10] Snell, S. Carcinoma of the orbit, originating in a Meibomian gland. Ophth. Rec., 1908, v. 27, p. 94.

[11] Shoji, Y. Un cas d'epithéliome primitif de la glande de Meibomius, envahissent la cavité orbitaire avec atrophie du globe oculaire. Arch. d'Opht., 1929, v. 46, p. 144.

[12] Sheehan, J. E. Plastic surgery of the orbit. New York, Macmillan Co., 1927, pp. 200-203.

NOTES, CASES, INSTRUMENTS

THE USE OF PROSTHESES OVER UNSIGHTLY EYES

C. O. SCHNEIDER, M.D.
CHICAGO

Considering the successful use of contact glasses for the correction of conical cornea and other defects of vision, and the surprising degree of comfort with which these thin transparent glass shells are often worn—so that frequently within a week the patient has learned to wear such a contact glass continuously for periods of six or eight hours—it occurred to me that a patient with a healthy globe, but with a scarred cornea or other unsightly anterior-eye condition could also, with equal safety and comfort, wear a contact glass which, instead of being transparent, is opaque and colored to match the opposite eye.

Fig. 1 (Schneider). Prosthesis over unsightly eye.

That this can be successfully accomplished is evidenced by an interesting case in my experience. A young lady attending high school eight years ago, while heating hydrochloric acid in a test tube, burned her left eye. The resulting leucoma covered the cornea. For this unsightly condition eminent oculists of Los Angeles, Buffalo, and Chicago, whom she consulted, had no remedy to offer except tatooing or enucleation.

Last August, during a visit here, she related her inability to secure a desirable teaching position for which she was qualified, because of the very apparent handicap of a blind left eye. She realized the detrimental effect of this deformity and the need of its correction, but before submitting to enucleation of the blind eye she wished my opinion as to which of the several operations would prove most successful.

The injured eye was quiescent. It appeared to be normal in size and tension. Vision was reduced to hand movements. There was partial ptosis of the upper lid, probably due to a defense reaction in an effort to hide the defect. The cornea as previously stated, was covered with a leucoma.

My advice was that an enucleation was not indicated, as an ideal result could be anticipated by wearing a perfectly fitting, very thin contact-glass-like prosthesis over the injured eye. This appealed to both the patient and to the artificial-eye maker, with the result that by the fourth day the patient left for California, wearing a thin prosthesis continuously and with perfect comfort and satisfaction. Recent reports from this patient confirm the complete success of the prosthesis. She says that motion of the eye and match in color is so perfect that her friends cannot guess which is the seeing eye.

This interesting experience would lead one to believe (1) that enucleation for an unsightly but comfortable eye may not be indicated; (2) that an artificial eye can be made thin enough to be worn successfully over an unshrunken globe; (3) that a patient can very soon wear such a prosthesis with comfort; (4) that the mobility of the prosthesis when riding over a natural globe with normal musculature is certain to be much better than when the prosthesis is resting on any sort of stump.

Shell eyes have been in use for many years and are frequently worn over stumps or shrunken globes, but now, with our recent contact-glass experience, we should not hesitate to advise the wearing of a very thin prosthesis over an unsightly eye. They can be made as thin as a contact glass, and are as safe and as satisfactory to wear.

31 North State Street.

A NEW AFTER-CATARACT TECHNIC

D. M. YAZUJIAN, M.D., F.A.C.S.
TRENTON, N.J.

The removal of an after-cataract or capsule remnant following a cataract operation, while simple in theory, is not always easy in its execution. Several years ago the author devised a simple instrument which he has been using in his after-cataract cases with great satisfaction. It is a small applicator with a flat end which is serrated on both edges.*

The pupil is widely dilated with atropine. After cocaine anesthesia a sharp discission knife-needle is inserted about 2 mm. below the limbus and the after-cataract is cut along the edge of the pupil. While withdrawing the knife-needle the entrance wound is enlarged so as easily to admit the comb. The latter is inserted on the flat, taking care that the serrated edges are not caught in the incision. When the middle of the comb reaches the center of the pupil it is gently pressed against the capsule and given several turns by twisting the handle. This maneuver wraps the capsule around the comb. Of course, the turning should be in one direction only, so as not to unwind the capsule. The comb is withdrawn on its flat side, care again being taken not to have the serrations get caught in the corners of the wound. When the comb comes out of the wound a few fibers from the upper part of the capsule may be found unbroken. These are cut with a pair of iris scissors, similar to the manner in which the iris is cut in an iridectomy. The wound is dressed in the usual way, as after an ordinary discission.

562 East State Street.

Fig. 1. (Yazujian). Instrument for a new after-cataract technic (actual size).

* The instrument is made by The George P. Pilling & Son Co., Arch and 23d Streets, Philadelphia, Pa.

SUMMARY OF ONE HUNDRED BARRAQUER CATARACT EXTRACTIONS

OTIS WOLFE, M.D.
MARSHALLTOWN, IOWA

Following is a summary of another series of one hundred attempted Barraquer cataract extractions. Ninety-one were removed with the capsule intact; only one needling of the posterior capsule was required. Ninety-nine patients had good or useful vision; seventy-three were cases of immature cataract. One eye was lost from expulsive choroidal hemorrhage accompanying a profound cardiac crisis in a patient aged 75 years, two-and-one-half hours after the cataract extraction.

SOCIETY PROCEEDINGS

Edited by Dr. H. Rommel Hildreth

NEW ENGLAND OPHTHALMOLOGICAL SOCIETY

November 20, 1934

Dr. Hugo B. C. Riemer, presiding

Myasthenia gravis?

Dr. Allen Greenwood reported the case of a woman, 34 years old, who came to him in September, 1931, complaining of double vision. She had already had two operations performed on the muscles of the right eye and four operations on the left eye. All this was done within ten months previous to her visit to Dr. Greenwood. Her vision was 20/20 with glasses; with the Maddox rod 15 degrees of esophoria was present. In view of the many operations already performed it was thought that operative procedure was unnecessary, but she was determined that something be done for the double vision. Therefore, a recession of the right internal rectus was performed. A 6-degree prism, base out, in each eye corrected the double vision and the patient was symptomatically relieved.

On November 18 she presented an anomaly, in that she had, with the Maddox rod, first exophoria and then esophoria, and the right eye would turn out at times. The prisms were taken off and she was all right again for some time, having developed orthophoria. In March, 1932, her double vision returned but she was relieved by a 3-degree prism, base out, in each eye. In September, double vision recurred and the left eye could not turn out. In March, 1933, she had double vision with marked esophoria, and stronger prisms, base out, corrected the double vision. In December there was 32 degrees of esophoria so a left-external-rectus advancement and tenotomy of the internal-rectus muscle were performed. After this operation the patient still had much esophoria and a possible diagnosis of myasthenia gravis was considered. In May, 1934, the left eye turned out and there was 40 degrees of esophoria and double vision.

In July there was again 50 degrees of esophoria and the patient was referred to Dr. Henry Viets, nerve specialist, to see if the eye developments were not due to myasthenia gravis. The patient had had spells of semiconsciousness, which would come upon her suddenly and without apparent cause. There was no optic neuritis. An operation was performed and the ventricles were opened and nothing found. The diagnosis, therefore, was still uncertain.

Hereditary eye conditions

Dr. David Cogan presented two sisters who had total color blindness. Four other children in the family were normal. This condition was presented as a recessive type of heredity, being latent in both parents and appearing in one third of the family. The patients saw better at night. Marked photophobia and nystagmus were present. The vision was 20/200.

He next presented a case of congenital anophthalmos as a recessive type of heredity, in which twenty-five percent of the children were affected. Neither parent showed the trait. It was probably latent.

Dr. Cogan said albinism was another hereditary condition in which twenty-five percent of the children were affected in the family. Neither of the parents showed such a condition. It was traced back six generations and was found to have occurred in Italy.

Retinitis pigmentosa is a recessive hereditary condition also. In the case presented the mother and father were cousins. In another family, one child out of three had such a condition. Here also the parents were cousins.

In a case of buphthalmos, Dr. Cogan said the parents were cousins and the child was one of four with the affliction.

Dr. Cogan presented a girl with con-

genital cataracts. This is a dominant type of heredity and was passed on from parent to child. The condition was traced back six generations in which it had occurred regularly in each generation. A brother and sister presented showed congenital dislocation of the lens. This too was a dominant trait passed on from parent to child.

Complete aniridia

Dr. Benjamin Sachs presented a 49-year-old man who had no iris and no lens. The patient had received a blow in the left eye, and when first seen the tension was high but it had since subsided to normal. With glasses his vision was 20/30.

Heredity in ophthalmology

Dr. Clyde E. Keeler from the Howe Laboratory for Ophthalmic Research read a paper on this subject which was discussed by Professor Gregory Pincus, from the Institute of Biology, Harvard University.

Analysis of fifty-five cases of toxic amblyopia

Dr. Frank D. Carroll reported the results of his studies of this condition which will be published in this Journal.

Malnutrition in relation to ophthalmia neonatorum

Dr. Charles Walker read a paper on this subject, which has been published in this Journal (December, 1934).

Uveo-parotid disease

Dr. David Cogan read a paper on this subject which will be published in this Journal.

Analysis of cataract operations

Dr. Herman P. Grossman reported an analysis of 1343 cases of cataract extraction attempted by the new Verhoeff intracapsular method. He presented charts and figures to prove that this method was accompanied by a very small number of ruptured capsules; that it was safer than other methods in vogue from the standpoint of vitreous loss; that it had definite theoretical advantages regarding the manipulation of the lens, which were substantiated by experience in this large series of cases; that it might be employed in any case of cataract other than juvenile or traumatic and that any one with ordinary skill and experience in eye surgery could obtain satisfactory results with this technic.

J. J. Regan,
Secretary.

ROYAL SOCIETY OF MEDICINE, LONDON

Section of Ophthalmology

December 14, 1934

Mr. Ransom Pickard, chairman

Reattachment of the retina after discission of soft cataract

Mr. Montague L. Hine showed this case not because it was one of reattachment of retina in an aphakic eye, but because it was the first case to be recorded of reattachment of the retina in an eye in which discission of soft cataract had been carried out. In the October 6 issue of *Lancet* there was an article by Mr. Charles Goulden, of London Hospital, in which it was stated that while a few successful cases of reattachment of the retina had been reported following operation on aphakic eyes, he had no knowledge that any case had been reported of successful operation on a detachment subsequent to removal of a soft cataract. This patient now shown had only the one eye, having lost the right eye after operation for a soft cataract when he was aged 11 years. The man was seen in 1931 because he was complaining that for six months things at which he looked appeared to have a ring round them, and on June 10, 1931, a green mist came over the eye.

With the correction, his vision was 6/9: nothing could be seen in the eye, and no changes in the retina were visible. Soon after that, apparently, everything cleared up, and he had no more trouble until last March, when he complained that a ring came at the bottom of the eye, and then the sight rapidly

failed. When seen on April 4 there was a large detachment up and in, and after he had been in the hospital 24 hours, a hole was found in the retina.

Mr. Hine thought it advisable to use the Safar method, partly because with the Safar point the operator could get farther back. The operation was performed on April 9. Though at first there was some fluid beneath the retina, two months after the operation all the scotomata up and in had gone, and for three months his field had now remained more or less constantly good. The reattachment had remained, so far, six months. The vision, it was true, was only 6/60, but sometimes he could read a letter or two of 6/36.

Quinine amblyopia

Mr. E. F. King said that this married woman took quinine in order to cause abortion, and three hours after doing so she suddenly became deaf, was aphasic, and partially blind. During the ensuing few days the blindness increased, but the other symptoms decreased. At the stage when the pupils were inactive and there was no perception of light, the retinal vessels showed only slight constriction. By the following day central vision had returned, though one could not demonstrate peripheral fields. A fortnight later the pupils gave a brisk response to light, though of limited range. At the time of showing the case there was some pallor of the discs, the vessels were somewhat contracted, and the field was markedly contracted. Central vision was 6/9 partly.

Discussion. Dr. A. J. Ballantyne (Glasgow) said the case illustrated a point which was not sufficiently noted in textbooks, namely that at the stage at which the vision was most profoundly lost, the fundus appearances were practically normal, and contraction of retinal vessels occurred at a later stage, when general recovery was taking place. He had seen a number of cases with this order of events, especially in Salonica during the War, where quinine in heavy doses was much used.

Mr. Eugene Wolff wondered whether in these cases the toxin got to the retina via the vitreous: if so, it would explain the vessels being affected after the ganglion cells.

Mr. T. Harrison Butler (Coventry) said that for four years he practiced eye work in Jerusalem, where malaria was endemic, and people took enormous doses of quinine. He occasionally saw cases of deafness follow this, but did not remember to have seen a case of quinine amblyopia. It seemed as if there must be some factor required, additional to the quinine, to cause blindness. Or it might be a racial immunity.

Mr. King, in reply, said that with regard to the effect of quinine, he had heard of three men who had been treated for hydrocele, quinine being the sclerosing solution used, and each of them was referred to the ophthalmic department because they complained of misty vision.

Cyst of sclera

Mr. D. Magor Cardell said there was no history of either injury or operation, though that did not preclude the possibility of some minor injury, because children who were being nursed frequently injured an eye against a pin or ornament which the mother was wearing in her upper dress. Such an injury might escape attention at the time, especially if the child was crying. Such an occurrence might explain what was seen in this case. The cyst had been enlarging rapidly, and was encroaching on and splitting the layers of the cornea. The exhibitor tapped the cyst, and found the contents of the consistence of aqueous, thin and clear. He proposed to cut off the anterior wall of the cyst.

Spontaneous orbital hemorrhages

Mr. E. F. King said that this patient had had on the previous evening, a sudden diplopia and pain in and around the left eye. There was a small ecchymosis of the left lower lid, the eye was proptosed and there was limitation of movement of the eye upwards and outwards. There was marked retinal sclerosis in both eyes.

Discussion. Mr. Ransom Pickard spoke of a person who also suffered from dead fingers, and who experienced a stabbing feeling like the sting of a wasp, followed by a hemorrhage. This

present patient also had dead fingers. The puzzle was that contraction of an artery should have been followed by hemorrhage.

Mr. King replied that if a vessel contracted, and later the blood flow was reëstablished, hemorrhage was likely to occur, because of the damage of the endothelium in the course of the contraction.

(Reported by H. Dickinson)

MINNESOTA ACADEMY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY

Section on Ophthalmology

December 14, 1934

Dr. J. S. Reynolds, president

Intravenous treatment of diseases of the uvea with gold sodium thiosulphate

Dr. W. L. Benedict said he recommended the administration of this drug, not as a specific remedy in uveitis, but in those cases of obstinate uveitis where other treatments had been of no avail. Treatment in such cases must be directed toward the human economy as a whole rather than toward the eye. He realized there were complications which might arise from its use.

Discussion. Dr. F. E. Burch, St. Paul, said he had had only a limited experience with the treatment of uveitis with gold sodium thiosulphate. In all the cases in which he had used it, he had been unable to get the patients to stay under his own observation, and had had to direct the treatment by their own physicians. There was virtue in this treatment even if it were not definitely known just how it acted. The thought occurred to him that these patients with chronic uveitis while under strict observation and prolonged treatment had a long period of more rest than previously, they were away from home and free from worries and stress. He wondered if Dr. Benedict did not think that the element of rest and good food and perhaps a more hygienic life at the time they were getting these injections might not also be factors in their improvement. One might get results in uveitis with intravenous injections of sodium salicylate, foreign proteins, calcium gluconate, etc., but one should not lose sight of the hygienic factors also.

Dr. Benedict said he used tuberculin and foreign proteins in the treatment of uveitis and some patients got well, but some did not. He called attention to cases of tuberculous uveitis that got worse under tuberculin or other therapy. Wardenberg stated that approximately 25 percent of persons with tuberculosis of the eye did not tolerate tuberculin well. Dr. Benedict had used old tuberculin, a Japanese preparation. Some patients improved under the administration of this type of tuberculin, and yet others got worse no matter what type of tuberculin was used.

The factors of rest, good food, and proper sanitation could not be evaluated, but many of the patients he had treated had been under proper living conditions in sanitaria or hospitals elsewhere, and, with the added administration of tuberculin, had continued to get worse. Those were the patients Dr. Benedict treated with gold sodium thiosulphate. He said he would not recommend it in cases, such as Dr. Spratt mentioned, of acute episcleritis and acute iritis. In the acute inflammatory diseases of the eye, gold sodium thiosulphate was not indicated. The drug should be given by a dermatologist, who was better able to discover complications if they appeared.

Dr. Benedict said he used milk or typhoid vaccine as a prophylactic or in treatment of sympathetic ophthalmia early in its course because he wanted a quick reaction. Gold salts might be used in the late stages of the disease. He felt that now there was adequate means of controlling sympathetic ophthalmia if treatment was instituted early and continued long enough.

A case of pseudoxanthoma elasticum and angioid streaks

Dr. William A. Kennedy, St. Paul, said that Miss R., aged 38 years, was first seen in 1931, at which time she gave asthenopic symptoms. Her vision was O.D. 20/20 minus 1, O.S. 20/25

plus 2. With lenses this was improved to 20/15 and 20/20. The note made concerning her fundi called attention to the tortuosity of the retinal vessels and patches of chorioretinitis. Because of her history and healed lung findings, the chorioretinitis was thought to be of tubercular origin.

The patient was seen by Dr. Kennedy in November, 1934, at which time the angioid streaks in the retina were noted in addition to the conditions before reported. The skin changes of pseudoxanthoma elasticum had been noticed by the patient since 1924. There had been no change in her visual acuity since 1921.

Walter E. Camp,
Secretary.

COLORADO OPHTHALMOLOGICAL SOCIETY

December 15, 1934

Dr. F. R. Spencer, presiding

Anophthalmia right eye; coloboma of iris and choroid left eye

Drs. R. W. Danielson and Edna Reynolds presented a two-months-old infant born to a 33-year-old woman by Caesarean section. There had been no other pregnancies. There was no history of eye defects in their family. The blood Wassermann of the mother was negative.

There was no right eye in the child, the lids on this side being pushed back into the orbit so that there was only a very small conjunctival socket; no vestige of an eye could be seen. In the left eye there was a coloboma of the iris below, and a corresponding coloboma of the choroid. Many fine strands from the iris to the lens were also present. Generalized convulsions were noted a few days after birth and had occurred every day since, with no evidence of abatement. The child had suffered greatly from constipation, apparently due to a very tight sphincter.

Because of the congenital abnormalities of the left eye, it was believed that the anophthalmia was developmental rather than due to a gonorrheal ophthalmia, as had been suggested in some reported cases. Birth enucleation by a deformed pelvis, as had been reported, could not apply here because of the manner of delivery. Dr. Danielson said the parents had been rather anxious to have a prosthesis fitted, and he wished to know whether the members of the Society would advise a surgical implant soon.

Discussion. Dr. E. M. Marbourg cited the case of complete anophthalmia with ankyloblepharon. In this family a child of the third generation had a similar defect.

Dr. W. H. Crisp said that no infection *in utero* seemed conceivable as a causative factor in such cases. There were a number of cases in the literature in which there were congenital cysts with a small rudimentary eye; the vitreous was fibrous and there was incomplete development of the intraocular vascular circulation.

Dr. L. L. Davis cited the report of von Hippel given in Parson's "Pathology." He reported 64 cases of anophthalmia, all but 23 were bilateral, 15 had one normal eye. In most of the eight remaining cases there was microphthalmia in the opposite eye. In only one of the 64 cases was there a coloboma of the iris and choroid in the opposite eye. Congenital defects in the optic tract and external geniculate bodies were found in some of these cases, and there was sometimes absence of the olfactory lobes.

The members were of the opinion that surgical interference was impracticable at this time.

Medullated nerve fibers

Dr. L. I. Davis presented the case of Miss M., aged 23 years, whose complaint was due solely to a refractive error. In the routine ophthalmoscopic examination a patch of opaque nerve fibers was found three disc diameters temporal to the left macula; the area was slightly larger than the disc. The retinal blood vessels were partly obscured in this area. Both fundi showed a pepper-and-salt appearance. The case was of more than usual interest because of the location of the medullated nerve fibers so far from the disc.

Extensive choroidal sclerosis

Dr. L. L. Davis presented the case of Mr. A. G., aged 69 years, who had complained of gradual loss of vision for the past 20 years. There was night blindness. The urine and blood Wassermann were negative. Ophthalmoscopic examination revealed sclerosis of the choroidal vessels throughout the fundus in both eyes. Depigmentation was extensive, with a few scattered clumps of pigment here and there. Both discs were pale and the retinal arteries were contracted. The visual fields were contracted for form, and a central scotoma was present in each eye. There was complete absence of color vision in one eye and a contracted field for blue only, in the other eye.

The pathological process, in all probability, started with sclerosis of the choroidal vessels, which resulted in poor nourishment to the outer layers of the retina and was followed by retinal atrophy and depigmentation.

Orbital endothelioma

Dr. G. H. Stine gave follow-up notes on the case of orbital tumor which he had presented at the October meeting. There had been a recurrence of symptoms with rather rapid increase in the proptosis. Total exenteration of the orbit was performed on November 9, 1934. There was a large, firm, well-encapsulated, lobulated mass above and behind the globe and adherent to the peribulbar structures. In the roof of the orbit, just above the mass, there was an area about two centimeters in diameter in which the outer table had been eroded, probably by pressure of the mass. The pathologist's diagnosis was perivascular endothelioma. The specimen was also sent to the Army Medical Museum, Washington, D.C., but no report had been received from them as yet. In view of the fact that the pathological diagnosis at the time of biopsy was small round-cell sarcoma the question was raised whether or not the intensive x-ray and radium treatment given between the time of biopsy (eleven months) and exenteration could have changed the character of the tumor. Perivascular endothelioma is less malignant than small round-cell sarcoma.

Edna Reynolds,
Secretary.

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* Deceased.

LIGHT AND DARK ADAPTATION

Adaptation to light and darkness has been chiefly studied in the human eye, and is probably quite a different phenomenon from the phototropism observed in the early life of some of the lower animals that seek or shun the light. The solar radiations include rays that vary widely in their biologic effects. Radiations of light and heat were the first to be studied. Then effects of the ultraviolet rays became known by photography, and were called chemical rays. Later the electro-magnetic vibrations have been studied as Hertzian rays and Roentgen rays, etc., until wave lengths have been measured varying in lengths from one ten-thousandth of a millimeter to many thousands of meters.

One of the first conditions of life was that forms of living matter, the parts of the living organism, should be able to protect themselves against the disintegration that might be caused by electro-magnetic vibrations of various lengths. From the need of eyes for self-protection, developed the power of adaptation. It is doubtful if other animals, even birds, have a light-and-dark adaptation comparable to that of the human eye. Adaptation has been developing through long biologic periods, in the slow increase and decrease of light in dawn and twilight, with the rising and setting of the sun. Not until men lived in houses and used artificial sources of light, did the eye have to contend with sudden changes of brightness.

But before the advent of human beings, the cat family had learned to seek its prey at night, and had attained wider dilatation of the pupil than is possible for most of the lower mammals. This character of dilatable pupil has been transmitted through the first primates to man. The human eye possesses both the slow adaptation that makes vision useful in full sunlight at midday, and in the forest at midnight; and during the day makes it possible for men to seek

shelter in caves. The need for the rapid adaptation of the eye has become enormously greater since the adoption of electric lighting within the memory of men now living.

The quick adaptation of the eye comes through contraction and dilatation of the pupil. With a sudden flash of light the pupil contracts almost instantly. By repeated flashes of lightning the swift pupillary contractions preserve enough of dark adaptation to be quite serviceable in the intervals between the flashes. When the pupil is contracted by such a flash, the contraction is immediately followed by a dilatation, and there is a series of contractions and dilatations that follows a decided change of illumination. These have been studied by various observers. It is generally agreed that these decreasing oscillations of the pupil, under laboratory conditions, may continue gradually for ten or fifteen minutes. The writer has experienced at times, when going out from a dark room into strong mid-day sunshine, a sharp pain in the eye, which lasted for several minutes and gradually declined. This seemed to be due to the spasmodic contraction of the pupillary sphincter.

There are some people who have as a congenital anomaly a pupil that will not dilate to more than two or three millimeters in diameter. Such eyes can read newspaper print, even when the ciliary muscle is fully paralyzed by atropine. But they are practically blind for many minutes after going into darkness. A mining engineer who had such pupils had noticed for years that when he went down into a mine with a group of men, the others could see immediately. But it took him ten or twenty minutes before he regained equally good vision. For most people who have an abnormal fear of light, the going into strong light is most disagreeable. Their unpleasant sensations are increased by fatigue, or nervous excitement. Such photophobia is not generally due to permanent unfitness for strong light, but to the sudden exposure to it. Care to prepare for the change, by looking out of a window, or standing in the shade two or three minutes on going out, will very often give relief from or prevent this annoying symptom.

There is need that ophthalmologists study the facts of light-dark adaptation, both from the side of personal experience and through the observations of intelligent patients. It is not likely that adaptation is so rigidly defined and limited by evolution that the experiences of one or a few observers could furnish adequate information for a full understanding of the subject. Even to determine what features of adaptation are general and important will require more wide and general acquaintance with the facts than can be acquired by a few investigators working in specialized laboratories. Some things which investigators have observed may have unsuspected significance; other things may be merely accidental and misleading. The wider observations are needed to discriminate which characters are general and important. Especially we need to know more about the slow, primitive, retinal adaptation to dawn and twilight, and the adaptation of eyes that present different forms of congenital, or acquired, amblyopia. The subject of afterimages is closely related to retinal adaptation, but that is another story. Edward Jackson

PERCUTANEOUS TUBERCULIN

Skin reactions play an extremely important part in the process of immunization. Among the infectious diseases, the most likely to be followed by satisfactory immunity against further attacks are those producing an exanthem, such as smallpox or measles. The skin is thus to be regarded as the chief source of immunity.

Löwenstein (Zeitschrift für Augenheilkunde, 1935, volume 85, page 191) insists that the best results in specific treatment of chronic tuberculous diseases of the eye are obtained in cases which give a sharp reaction at the site of inoculation. For this reason, many of those ophthalmologists who use tuberculin have substituted the intracutaneous for the subcutaneous method of administration.

Unfortunately, with the utmost care as to dosage, even the intracutaneous

method frequently produces very disagreeable general and local disturbances, although superior in this respect to the subcutaneous method. The danger is particularly present in cases of recurrent hemorrhage into the vitreous.

For these reasons Löwenstein has for some time resorted to what he calls the percutaneous mode of inoculation. An area as large as the palm of the hand is abraded with a square of sandpaper, to the extent of removing epithelium, but without producing even minimal amounts of bleeding. On to the abraded area is dropped old tuberculin in a dosage beginning with one drop and increasing to eight drops, and the vaccine is rubbed in vigorously with a glass rod. It is possible to use this method even in cases of extreme hypersensitivity to tuberculin, for the skin reaction is accompanied by little or no local reaction.

The cutaneous reaction consists of diffuse reddening of the inoculated area, usually appearing after twenty-four hours, and sometimes associated with formation of minute blebs. A further application should not be undertaken until five days have elapsed after complete disappearance of the skin reaction. In the course of three years of steady use of this method, Löwenstein has never seen an incidental rise of temperature. A few patients had headache at the height of the reaction. A striking accompaniment of the skin reaction was a decided paling of the affected eye.

In illustration, Löwenstein cites the case of a physician of fifty-five years who had had many recurrences of iridocyclitis in each eye. He also suffered from severe painful curvature of the cervical and upper thoracic spine. The percutaneous method gave a very marked skin reaction, with bleb formation. All the iritic symptoms disappeared much more rapidly than in previous relapses, and there was also a surprising cessation of the supposedly rheumatic pains in the vertebral column, which hitherto had been constantly present. The patient continued his own treatment for eight months without ocular recurrence and with great improvement in the spinal condition.

William H. Crisp.

LENS SEGMENTS FOR DIVERS PURPOSES

Among the many advances in the science of optics, one of the most useful has been the notable improvement in bifocal lenses since their introduction. Admitting that some of the refinements may be "ultra," exceeding the necessity or even the appreciation of many to whom they are sold at an increased cost over the standard models, no one can question the tremendous advantage of fused forms over "pasters" or of the possibility of using segments of a size and shape suited to the vocation or avocation of the wearer.

It is only the inexperienced ophthalmologist who overlooks the importance of giving careful thought to prescribing the most acceptable bifocal for his patient. Many a patient has been rendered unhappy and dissatisfied with his eye physician because an unfortunate choice was made in this part of the prescription. That one type of segment is not ideal for every kind of work is obvious; that for certain vocations the best that is possible in shape, size, and position is far from satisfactory is equally apparent, but much may be done to select the most useful form for the individual need.

It is well to allow ample time for this phase of the consultation. Too often, after a very careful refraction and general study of the ocular condition, only a very brief time is taken to consider the exact use which the patient wishes to make of his glasses. Probably most oculists inquire concerning the patient's occupation and have recognized the special needs of workers engaged in certain activities, such as stenography, music, machine-shop work, card playing, and so forth, and have come to conclusions as to what focal distances are required and what sized segments for each of these, but this is by no means the whole problem even if the general principles have been well considered because individual differences exist in the work in all of these vocations and in the preferences of the patient.

By the time the age of bifocals is

reached, habits are deep rooted, adaptability has grown markedly less, and no patient wishes to be fitted to bifocals after the manner of the Procrustean bed. If the stenographer has had her typewriter at eighteen inches and her "copy" at twenty-six inches, for many years, she will be seriously inconvenienced if she must change either of these two distances; but it is not so simple to find a bifocal that will satisfy her if she happens to have clung to single lenses until her late "forties."

Some interesting suggestions have been made by Theodore E. Obrig in "Guildcraft" (volume viii, No. 5, p. 20) in an article entitled "Vocational Bifocals and Trifocals." He first considers "high segments," including in the group for which they are adapted "architect, author, accountant, bookkeeper, draftsman, jeweler's mechanic, lecturer, librarian, proofreader and teacher." By high segment he means one that "should almost cover the entire pupil exit when the patient is looking straight in front of him." With this, as with other special designs, the particular lenses that fulfill the requirements are designated by their trade names. That those engaged in the professions specified will be helped by these high-segmented lenses is undoubtedly true. The obvious objection to these as to the others mentioned later is that they are not general utility glasses, so a second pair is necessary for purposes other than the special vocational. During the period of rapid loss of lens elasticity, with the consequent necessity of frequent lens changes, this becomes an important economic factor, hence only the absolute need of such vocational lenses will justify the physician in ordering them in many cases.

Among those for whom a very small segment is useful are listed only the golfer and builder as examples. One optician in St. Louis has made rather a practice of inducing patients to try thirteen-millimeter segments and those who have become accustomed to them have usually become much attached to them.

Space permits a discussion of only a few of the types presented in this interesting article. Several suggestions for the surgeons are made; among others, a large round segment in the center of the lens is advised. The editor has not used this form but has found a quarter-sized round segment placed at the lower rim of the lens to be very useful for the general surgeon. A somewhat similar high-segment lens was said by an ophthalmologist who used it to be of great value in his office to prevent the continual backward tilting of the refractionist's head when adjusting lenses in the trial frames on the patient's face.

Odd designs for artist, sculptor, hunter, and trap-shooter are depicted. There is much room for originality in all of this and the present ability to place the segments wherever desired and to make them of shapes and sizes as wished may render it possible to give satisfaction and comfort to those of presbyopic age engaged in occupations which have heretofore been greatly handicapped by the necessity of good sight at different distances.

Lawrence T. Post.

BOOK NOTICES

The biochemistry of the eye. By Arlington C. Krause. 264 pages. The Johns Hopkins Press, 1934, Price $3.25.

This volume is the second monograph from the Wilmer Ophthalmological Institute. There has been a real need for such a concise, accurate compilation of data from the fields of physiology, chemistry, anatomy, pathology, immunology, and ophthalmology. The book is divided into eight chapters dealing with the chemistry of the structures of the eye.

The composition of the tears; the alterations in the hydrogen-ion concentration with disease, the lysozyme concentration are presented in detail. The chemistry of the cornea has been extensively investigated. The imbibitory ability is remarkably constant, depending on the integrity of the endothelium and epithelium. The trigeminial nerve controls the epithelial permeability; if the nerve is irritated, edema occurs; if

sectioned, the epithelium desquamates. The tonicity of the iris and ciliary muscles is governed by adrenalin and acetylcholine, which are normally present in the muscle cells. The action of miotics and mydriatics depends on their chemical action on acetylcholine. The physiology of the retina and the relationship of vitamin-A deficiency and night blindness is of practical value. The voluminous literature of the chemistry of the aqueous and vitreous humors has been well selected and presented in a critical, understanding manner. The modern concept of glaucoma is so related to physiological chemistry that these chapters warrant thorough study by all oculists confronted with glaucoma. The growth and senescence of the lens with the ensuing chemical changes are of interest.

The bibliography is extensive and accurate. This book brings together in an unbiased yet critical manner the recent results of a vast amount of research in the basic sciences of medicine.

William M. James.

Directory of the American Board of Ophthalmology, 1935. Cloth, 230 pages, Published by the Board, Chicago, 1935.

This volume shows the work done by this Board to raise the educational standards of ophthalmologists in the United States. Since its first examinations, held at Memphis, Tenn., in December, 1916, the certificate of the Board has been awarded to 1012 of those who have appeared before it. Of these 875 are now living in the United States, 20 in Canada, and 8 in other countries; while 109 have died. There have been thirty ophthalmologists who have served on this Board, of whom seven are now deceased.

In addition to the lists of the above, there is a list of the certified ophthalmologists, with their addresses, arranged by states. This will be found very useful to any physician, for reference of patients who might need ophthalmic care while traveling.

The work of the Board and this book show an important step forward in the organization of the medical profession. The standing and influence of the Board has largely been due to the continued service of its secretary, Dr. William H. Wilder. This kind of service is now being rendered by a number of other Boards that have followed the example set by the Board of Ophthalmology.

Edward Jackson.

Section on Ophthalmology of the American Medical Association. Transactions of the meeting for 1934. Cloth, 360 pages, illustrated. Chicago, American Medical Association, 1935.

The minutes of the meeting, reports of committees, lists of members, index, etc., occupy 60 pages; the scientific papers and discussions fill 285 pages, about 40 being given to the discussions. Most of the papers have been published in the Journal of the American Medical Association, or in special journals, but the condensed discussions are published here for the first time, and these discussions represent the points of view and observations of a larger number of ophthalmologists than appear as authors of papers.

Retinal detachments, or separations, and clinical experiences, or methods for its treatment, occupy 48 pages. There is a report of experimental research on thallium poisoning, a case of orbital tumor removed through transcranial approach, and a case of scotomas caused by callus extending into the optic canal. The correction of aphakia involves certain optical factors that may cause puzzling results. Chronic uveitis and the etiology of conjunctivitis are the subjects of papers. A case of sarcoma of the uveal tract following trauma is reported. A routine muscle examination is described, and there is a paper on anterior lenticonus. A case of pulsating exophthalmos, due to carotid-jugular aneurysm, is described; and one of blepharochalasis. Diabetic cataract in young patients, orthoptic treatment of strabismus, and observations on the optic foramina of 4000 human skulls, are the subjects of papers. New instruments and apparatus are also described.

This review of the work of the Section at its annual meeting, demonstrates how valuable attendance at such meetings must be; and that no ophthalmologist can hope to keep abreast of the advances in his special line of work without having and studying the transactions of such meetings.

Edward Jackson

Practice of refraction. By Sir Stewart Duke-Elder. Second edition. 383 pages, 180 illustrations. Philadelphia, P. Blackiston's Son & Co. Inc., 1935. Price $4.00.

The first edition of this valuable book appeared in 1928. The additions mentioned in the preface to the second edition include the recent work on the incidence of refractive errors and the etiology of myopia, the treatment of muscular imbalance and of squint by orthoptic methods, the refractiometer, and the use of contact glasses.

The book is divided into six sections as follows: I. Introductory, II. Refraction, III. Accommodation and convergence, IV. The muscle balance, V. Clinical methods, VI. Spectacles.

This is an excellent textbook, essential facts being clearly and concisely expressed. The entire material is presented in a readable manner and serves admirably to give a comprehensive outline of the subject. The author's purpose in offering this volume is best expressed in his own words: ". . . the art of refraction cannot in any sense be learned by reading. There is only one way of attaining efficiency therein, and that is by assiduous and painstaking practice in the clinic of a hospital, where large numbers of cases of all kinds are available, where the findings can be supervised and corroborated, and where long practice makes the interpretation of results instantaneous. If these pages serve as a guide in this they will have achieved their aim."

Lawrence T. Post.

CORRESPONDENCE

Reflex spasm simulating embolus of the central retinal artery

Editor,
American Journal of Ophthalmology:

Under the above heading, Dr. Wilber F. Swett contributes to the April issue of the Journal (Series 3, v. 18, p. 359) a vivid account of a most interesting case in which the dramatic incidents developed under the eyes of the reporter. The patient's right antrum had been washed and then *blown out* (italics mine). At once the patient complained of sharp pain in the left eye and immediately after there was swelling of the lower lid "as if water had been injected into the orbit." Examination of the fundus showed it to be "nearly colorless with completely empty vessels" with a bright (red?) spot at the macula and "milkiness of the whole macular region." This classical picture (of embolism) was soon followed by marked dilatation of both sets of vessels and abnormal pulsations which seemed to involve the whole disc. The vessels gradually (in about half an hour) returned to normal but in another half hour there was an acute attack of glaucoma (T^{+++}) with "the whole fundus tremendously engorged." This was rapidly aborted by massage, eserine, and hot compresses, and vision soon returned to nearly 20/20, and in the course of a few days the retinal vessels again appeared normal.

So much for the case report. The author concludes, "If the patient had been seen an hour or so after the onset, the diagnosis would have been a typical case of embolus, but having been seen immediately after occurrence and watched until recovery it was possible to make a correct diagnosis of reflex spasm of the central retinal artery."

With all due deference, and in full cognizance of the fact that, not having personally observed this case, as the reporter has so sharply done, my comment may appear highly hypothetical, may I venture to suggest that it was also possible to make another diagnosis? The findings, to my way of

thinking, were not those of reflex spasm of the central retinal artery. They were much too marked and too severe. The bright (red?) spot at the macula with surrounding milkiness, due to edema, is, as far as I know, never seen with simple spasm, which latter does not last long enough to cause such pathological alterations in the vessel walls (veins and capillaries, probably) as to produce exudation. The fundus signs were, in fact, those of a complete, i.e., main-trunk, embolism. Nor, as far as I know, is the resultant upset in circulation so violent in this case as to bring on an attack of acute glaucoma, the logical sequela of spasm, however severe. Let us go back to the case report. Note that the antrum was not only washed out, but "blown out by air," and that at once there was sharp pain in the opposite eye and what, to me, at least, and at a distance, looks like traumatic emphysema of lids and orbit. Almost simultaneously there are flashes of light and sudden blindness of the "antrum-side" eye. Does not all this suggest that we *are* dealing *in fact* with an embolism of the central artery, but with an embolism, not of tissue but—**of air?**

(Signed) Percy Fridenberg.
38 West Fifty-ninth Street,
New York

ABSTRACT DEPARTMENT

EDITED BY DR. WILLIAM H. CRISP

Abstracts are classified under the divisions listed below, which broadly correspond to those formerly used in the Ophthalmic Year Book. It must be remembered that any given paper may belong to several divisions of ophthalmology, although here it is only mentioned in one. Not all of the headings will necessarily be found in any one issue of the Journal.

CLASSIFICATION

1. General methods of diagnosis
2. Therapeutics and operations
3. Physiologic optics, refraction, and color vision
4. Ocular movements
5. Conjunctiva
6. Cornea and sclera
7. Uveal tract, sympathetic disease, and aqueous humor
8. Glaucoma and ocular tension
9. Crystalline lens
10. Retina and vitreous
11. Optic nerve and toxic amblyopias
12. Visual tracts and centers
13. Eyeball and orbit
14. Eyelids and lacrimal apparatus
15. Tumors
16. Injuries
17. Systemic diseases and parasites
18. Hygiene, sociology, education, and history
19. Anatomy and embryology

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1. GENERAL METHODS OF DIAGNOSIS

Balbuena, F. F. **Modification of technique for silver impregnation of connective tissue.** Arch. de Oft. Hisp. Amer., 1934, v. 34, Dec., pp. 634-637.

The author describes his modification of the silver methods used by Cajal, Tello, Achucarro, and Rio Ortega for impregnation of connective tissues with silver. The paper is beautifully illustrated with fifteen photomicrographs showing the connective tissue arrangement in different histologic and pathologic conditions. Ramon Castroviejo.

Berens, Conrad. **A clinical ophthalmic ergograph.** Amer. Jour. Ophth., 1935, v. 18, Feb., pp. 139-142; also Sec. on Ophth., Amer. Med. Assoc., 1934, 85th session, p. 283.

Bressler, J. L. **A strabismometer.** Jour. Amer. Med. Assoc., 1934, v. 103, Oct. 27, p. 1298.

A perimeter of thirteen-inch radius marked with single-degree graduations, and which can be firmly fixed at any desired height, is described and illustrated. George H. Stine.

Castroviejo, Ramon. **Photography of the eye with the miniature camera.** Amer. Jour. Ophth., 1935, v. 18, April, pp. 353-356.

Diaz-Caneja, E. **Ophthalmoscopy and photography of the retina in infrared illumination.** Bull. Soc. Franç. d'Opht., 1934, 47th year, pp. 69-72.

In a preliminary study the author observed that in red and infrared illumination the vessels of the choroid were visualized and could be studied ophthalmoscopically and photographically. P. J. Leinfelder.

Fazakas, Alexander. **Fungi cultivated from the conjunctiva, cornea, lid margins, and tear passages.** Graefe's Arch., 1935, v. 133, p. 461.

Among 1017 eyes with ocular disorders, fungi were cultured in 365, or 35.8 percent. From 160 well eyes, fungi were grown in 39, or 24.3 percent. H. D. Lamb.

Fontana, G. **Slitlamp studies of the corneal limbus.** Rassegna Ital. d' Ottal., 1934, v. 3, Nov.-Dec., p. 888.

By means of the biomicroscope, Fontana studied the vascular tissues of the limbus in a large number of cases of trachoma and other diseases of the cornea. He considers the extension of the smallest vascular loops into the cornea

as a diagnostic sign of trachoma, since this change is found even in cases without corneal complications. In follicular and papillary conjunctivitis, phlyctenule, ulcerative and fascicular keratitis, and acute and chronic glaucoma, the extension of small loops does not occur. In phlyctenule and ulcer a few loops may extend into the cornea, and they occur familiarly in interstitial keratitis. They may be present in acute glaucoma but are absent in the chronic form. The author considers the presence of these loops in the superficial cornea to be a part of the trachomatous process, a true trachoma of the cornea. They extend well around the limbus and act as a protection to the cornea from the virus of the disease. (Four figures.)

E. M. Blake.

Fowler, J. G. **A universal perimeter.** Arch. of Ophth., 1934, v. 12, Dec., pp. 910-912.

A light, portable folding perimeter with a radius of 33 cm. is described and illustrated with photographs. The attached light gives seven foot-candles at the end of the arc and ten at the center. It can be suspended above bedridden patients.

J. Hewitt Judd.

Hesse, Robert. **A simple method for detection of malingering.** Klin. M. f. Augenh., 1935, v. 94, Jan., p. 81.

The patient must not notice that the surgeon doubts his statements during the preliminary tests. If there is a discrepancy between objective findings and subjective visual tests the patient is told that by a combination of glasses an improvement may be obtained and is subjected to the following procedure: If the objective examination has not revealed hypermetropia, + 3.00 sphere is placed before the eye. The patient will of course indicate a considerable impairment of vision, but can easily be induced to acknowledge an improvement by adding concave lenses to the plus sphere. As soon as the concave lens approaches the strength of the convex glass the improvement obtained by the addition becomes so striking, that it is unconsciously admitted by the majority of the patients.

C. Zimmermann.

Howell, S. C. **Action of epinephrin on the normal human eye. Use of the stronger solutions for instillation.** Arch. of Ophth., 1934, v. 12, Dec., pp. 833-841.

A two percent solution of synthetic epinephrin was instilled four times at ten-minute intervals into one eye each of fifty men and fifty women with normal eyes. The size of the pupil and tension were recorded after one hour and after twenty-four hours. The records given in a table show that in fifty-eight percent there was no change in tension after one hour but a distinct drop at the end of twenty-four hours, the average change being 6.2 mm. In six instances the tension was unchanged and in three a slight rise preceded the fall. No relation was found between reduction of tension and age or sex. A slight decrease in tension may be found in the opposite eye. Mydriasis occurred within one hour in ninety-eight percent and returned to normal in twenty-four hours in fifty-four percent. The average increase in size was 4.6 mm. The author advocates epinephrin for examination of the fundus and media in cases in which atropin is contraindicated.

J. Hewitt Judd.

Jablonski, Walter. **The significance for ophthalmology of the modern psychology of perception.** Klin. M. f. Augenh., 1934, v. 93, Nov., p. 676.

Jablonski compares old and new theories, emphasizing that within the new psychology many trends and opinions are in controversy.

C. Zimmermann.

Kugelberg, I. **The fundus in infrared light.** Acta Ophth., 1934, v. 12, pt. 3, p. 179.

Because infrared light is used effectively for photography in haze and fog, it seemed desirable to try it for fundus photography in cases with vitreous opacities. The author discusses the reproduction of the individual elements of the fundus in this light, and shows by means of photographs in blue, yellow, red, and infrared light that infrared photography offers no advantages to compensate for its technical difficul-

ties. White areas, hemorrhages, and the optic disc do not lend themselves to accurate reproduction in infrared light. Abnormal pigmentation, which photographs well, shows just as well in red light. (Illustrations.) Ray K. Daily.

Lijo Pavia, J. **Cinematography of the fundus.** Rev. Oto-Neuro-Oft., 1934, v. 9, Oct. p. 325. (See Amer. Jour. Ophth., 1933, v. 16, Dec., p. 1115.)

Lodato, G. **Pupilloscopy and adaptometry.** Arch. di Ottal., 1934, v. 41, Dec., p. 306.

Sander's pupilloscope was used to measure motility and Nagel's adaptometer to measure the light sense, in normal and pathologic eyes. In normal subjects and those with ametropia unaccompanied by pathology, the pupilloscopic and adaptometric readings were found to be within physiologic limits. Motor activity of the iris was found to be less than normal in fifteen of thirty-eight pathologic cases, and the light sense was affected in twenty-nine of these cases. The author concludes that in many cases the light reflex and light sense show no parallelism and may even be entirely independent.

H. D. Scarney.

Ohm, J. **Optokinetic nystagmus in hysterical blindness.** Zeit. f. Augenh., 1935, v. 85, Jan., p. 65.

Ohm gives in detail an analysis of his tracings from a patient in whom optokinetic nystagmus could be elicited though he claimed to be totally blind. Whether there was gross malingering or hysteria Ohm cannot say, but he points out that the production of optokinetic nystagmus is one of the most valuable of diagnostic measures.

F. Herbert Haessler.

Paul, Ludwig. **Contribution to localization ophthalmoscopy. 3. Determination of the axial length of the eye, its range of application in the relative method of calculation.** Graefe's Arch., 1935, v. 133, p. 254.

The axial length of the eye is a function of corneal radius and refraction. Neglect of the refraction of the lens (hard to determine) and of the depth of the anterior chamber leads to slight inaccuracies usually not exceeding 1 to 2%. The calculated axial length is designated as the "apparent axial length." In aphakic eyes it is possible to estimate the "true axial length." The variation of the axial length in anomalies of refraction is shown arranged upon appropriate curves, so that it is easily possible in exceptionally large numbers of eyes to undertake determinations of axial length which should serve for statistical researches. Comparative determinations of the apparent axial length of two hundred eyes in various anomalies of refraction show that in every condition of refraction large variations of the axial length occur.

H. D. Lamb.

Piesbergen, H. **Constellation pathology and ophthalmology.** Klin. M. f. Augenh., 1934, v. 93, Dec., p. 765.

The principle of constellation pathology says that in the etiology of a morbid change there is never one definite causal factor but a constellation of causal factors at a certain moment. This is discussed in detail and illustrated by examples, with the purpose of establishing for constellation pathology in ophthalmology the position which according to the author it deserves.

C. Zimmermann.

Zamenhof. A. **Ophthalmoscopy in focal and indirect light.** Klinika Oczna, 1934, v. 12, pt. 4, p. 631.

For the difficult method of Koeppe, requiring the use of a contact glass, the author substitutes the Gullstrand simplified ophthalmoscope, armed with a 32 D. convex lens, so arranged that the image of the slit is projected on the aerial image of the fundus. The lens of the ophthalmoscope then throws on the retina a movable luminous band. Fundus examination in this light offers no more difficulty than ophthalmoscopy in diffuse light. Drawings of the fundus illustrate the interesting pictures thus obtained, particularly in retinal detachment. The method permits easy recog-

nition of retinal tears and of the various stages of papilledema. In the light reflected from the fundus opacities of the lens and vitreous stand out sharply. (Illustrations.) Ray K. Daily.

2. THERAPEUTICS AND OPERATIONS

Arkin, W. **Ambulatory ocular surgery.** Klinika Oczna, 1934, v. 12, pt. 4, p. 662.

Within the last three years 1,500 ambulatory ocular operations were performed in the Warsaw Infirmary. The author believes that a surgeon with good technique and sound judgment may perform as ambulatory practically all ocular operations except cataract extraction, and those requiring general anesthesia. Ray K. Daily.

Bellows, J. G. **Surface anesthesia in ophthalmology. Comparison of some drugs used.** Arch. of Ophth., 1934, v. 12, Dec., pp. 824-832.

The anesthetic effect on the normal human cornea, as to the interval for maximum action and as to duration, was determined by means of a series of Frey's hairs after one drop of each solution. In the order of their effectiveness they are 0.5 percent P-n butylaminobenzoyl-dimethylamino-ethanol hydrochloride (pantocaine), 1:500 solution of nupercaine, 1 percent butyn, 2 percent cocaine, 1 percent phenacaine, and 2 percent metycaine. The deepest anesthesia was produced by pantocaine, the most expensive, and the longest effect was obtained from nupercaine, the least expensive. (Graphs and tables.)

J. Hewitt Judd.

Jameson, P. C. **Use of thyroxin in ophthalmology. Its application as a local agent and its action as a metabolic alterative.** Arch. of Ophth., 1934, v. 12, Nov., pp. 635-643.

To determine whether thyroxin is a local metabolic stimulant of cell activation, the natural product was used in about seventy-five cases in solutions varying from 1 mg. to 5 mg. per c.c. without producing toxic symptoms or a marked local disturbance. Of twenty-five cases of incipient cataract, none showed retrogression, and the majority had slight improvement of vision. Tension was moderately reduced without miosis. Thyroxin apparently relieves ocular tenderness and causes marked improvement in keratitis and vitreous opacities. Six illustrative cases are reported in detail. The author suggests that the cheaper and more stable synthetic product containing 2 mg. per c.c. may be just as effective, and he advises instillation two or three times a day.

J. Hewitt Judd.

Kapuscinski, W. **Akinesis.** Bull. Soc. Franç. d'Opht., 1934, 47th year, pp. 191-195.

Akinesis is obtained by blocking those fibers of the facial nerve which supply the orbicularis. The point of injection, which lies inferior to the zygoma, is determined by stimulating the nerve with the galvanic current. The levator palpebrae is also injected with novocaine to allow closure of the lid.

P. J. Leinfelder.

Law, F. W. **A new therapeutic diathermy electrode.** Brit. Jour. Ophth., 1935, v. 19, Feb., p. 96.

This apparatus consists of a head band with a base plate which rests on the forehead. In the base plate is fitted a stem with a rotatory point. Through a hole in the stem runs a suitably curved rod to the end of which is attached the electrode. Adjustment is obtained by means of the rotatory joint and a thumb screw placed where the rod passes through the stem.

D. F. Harbridge.

Löwenstein, Arnold. **Percutaneous tuberculin therapy in ocular disease with the help of sandpaper.** Zeit. f. Augenh., 1935, v. 85, Feb., p. 191.

The skin is the chief source of all immunity. Even after intracutaneous injection of tuberculin, a general and focal reaction may follow which, in the eye, may be of the greatest danger. To produce a maximal skin reaction with general manifestations is the ideal of tuberculin therapy. To accomplish this,

Löwenstein cleanses a skin area larger than the palm of the hand with benzine and rubs it with sterile sandpaper to free it from epithelium without producing any hemorrhage. He drops one to eight drops of old tuberculin on to the area and rubs it in with a glass rod. A dressing is unnecessary. In twenty-hours hyperemia appears and often tiny vesicles form. Even the strongest reaction disappears in eight to ten days. A rise in temperature has never been noted. When the procedure is repeated, the previously used skin area often reacts anew. The decrease in inflammatory reaction in the eye following such a treatment is striking.

F. Herbert Haessler

Machemer, Helmut. **Tying knots in operations on the eye.** Klin. M. f. Augenh., 1935, v. 94, Jan., p. 87. (Ill.)

The author describes his method of tying the reef-knot on the eye, which avoids traction on the suture and avoids crossing the hands. The different phases are photographed. C. Zimmermann.

Morelli, E. **Late effects, iontophoresis, and tropism in ocular therapy with arsenobenzol.** Boll. d'Ocul., 1934, v. 13, June, pp. 754-765.

The writer discusses the remote beneficial effects of arsenobenzol therapy in eye lesions of luetic origin, and sometimes also in tuberculous and malarial cases; the less toxic trivalent arsenicals being preferred. He does not attribute any therapeutic importance to arsenobenzol iontophoresis or organotropism. The article is obscurely written and of little value. M. Lombardo.

Perry, C. S. **An improved eye needle.** Amer. Jour. Ophth., 1935, v. 18, March, p. 258.

Rossi, G. **Action of testicular extract on penetration of fluorescein and other drugs in the eye.** Arch. di Ottal., 1934, v. 41, Dec., p. 331.

Extracts of various organs have the property of increasing cellular permeability. The following conclusions are drawn following the author's experiments: Testicular extract retards the diffusion of fluorescein into the anterior chamber. Injected subconjunctivally with adrenalin it markedly retards the mydriatic action of adrenalin. Injected subconjunctivally with atropin it has an inhibitory effect on the mydriatic action of the atropin. The miotic action of pilocarpin and eserin is increased by testicular extract instilled in the conjunctival sac or injected subconjunctivally. H. D. Scarney.

Teulières, M. and Beauvieux, J. **Histologic studies of the normal human eye after the use of atropin and pilocarpin.** Bull. Soc. Franç. d'Opht., 1934, 47th year. pp. 163-175; also Arch. d'Opht., 1935, v. 52, Feb., p. 65.

Gross and microscopic appearances of eyes after atropin and pilocarpin are described. Atropin dilated the pupil: the iris was thickened, the dilator muscle was clearly seen, the sphincter was thin, and the filtration angle was partially closed. In the ciliary body the Rouget muscle was apparently relaxed. In the eye with pilocarpin the iris was thin, the sphincter of the iris and Rouget's muscle in the ciliary body were thickened. The authors draw no conclusions concerning accommodation.

P. J. Leinfelder.

Waller, R. G. **Atropin irritation and its prevention.** Trans. Ophth. Soc. United Kingdom, 1934, v. 54, p. 96.

The author combined atropin with an acid protein obtained from human tears and formed a stable protein-alkaloid salt. In thirty cases of atropin irritation an initial dose of 0.1 c.c. of a 1 percent solution was injected subcutaneously; and according to the reaction obtained subsequent weekly or biweekly injections were given, gradually increasing the dose to 0.25 c.c. The final amount was repeated once or twice, and the total number of injections given was as many as seven. The immunity usually lasts for at least a month. Of the thirty cases treated, twenty-one were completely immunized, six of the remaining cases showed sufficient improvement to enable treatment to be

continued, and three cases failed to react at all. Beulah Cushman.

Weve, H. **The use of diathermy in ophthalmology.** Nederlandsch Tijdschrift voor Geneeskunde, 1935, Feb. 23.

Eyelashes may be removed in the same manner as with electrolysis. Cysts of Moll and warts are removed without leaving scars. Brushing with a coagulating diathermy needle over the center of a xanthelasma produces an ideal and usually permanent cure. The removal of carcinomata and sarcomata of the eyelids causes very little scar-retraction and no trichiasis, and rarely needs to be followed by plastic surgery. It is surer, more rapid, and far less dangerous than radiation. Angiomata may be treated more successfully than by other methods.

Weve shows pictures of an epibulbar sarcoma on the remaining eye of a fifty-one-year-old woman, thus treated. Five years' observation proves success. He has treated similar cases as successfully. Intraocular glioma and melanosarcoma have been destroyed with hardly more loss of function than would correspond with the part of the retina involved. A few years ago Weve showed a two-and-a-half-year-old child with two gliomas in the remaining eye, the other having been destroyed by a neglected glioma. These two tumors were destroyed by diathermy with scars hardly larger than the original tumors and leaving good vision. In four cases intraocular tuberculomata have been treated in the same way. These progress on into the retina and often produce cloudiness of the vitreous. The amount of diathermic current should be so chosen that the entire diseased region becomes coagulated.

With Weve's treatment of detachment of the retina by diathermy in the past three years eighty percent or more of recent cases have been cured. Diathermy is useful in allaying obstinate orbital spasm, the faradic current affecting the branches of the facialis which enter the orbicularis muscle.

E. E. Blaauw.

Weymann, M. F. **The use of sclerosing solutions in ophthalmic therapeutics.** Amer. Jour. Ophth., 1935, v. 18, April, pp. 323-330; also Trans. Amer. Acad. Ophth. and Otolaryng., 1934, 39th meeting, p. 152.

3. PHYSIOLOGIC OPTICS, REFRACTION, AND COLOR VISION

Bichelonne. **Reflections and accessory images in correcting lenses.** Bull. Soc. Franç. d'Opht., 1934, 47th year, pp. 25-35.

Accessory images occur by simple reflection, and are more noticeable when the convex surface of the correcting lens is toward the eye. Reflection also occurs at the two surfaces of the correcting lens, but more significantly between the anterior surface of the cornea and the posterior surface of the correcting lens. Multiple reflections are unimportant because such images are too faint to be visible. P. J. Leinfelder.

Colenbrander, M. **Subjective color phenomena.** Acta Ophth., 1933, v. 11, pt. 4, p. 437.

The author discusses the various theories explaining the color sensations produced by Benham's rotating disc. His own theory attributes the phenomenon to the interaction of three factors—rapidity of rotation, rhythm, and arrangement of the light and dark bands. (Illustration.) Ray K. Daily.

Cowan, A. **Patented lenses; facts versus advertising copy.** Jour. Amer. Med. Assoc., 1934, v. 103, Nov. 3, p. 1377.

A perfect wide-angle or point-focal lens to correct out astigmatism of oblique pencils in both the distance and reading portions of bifocals is absolutely impossible. Nor is such a lens clinically necessary. The theory of wide-angle lenses has been known for a great many years, and the implications in the advertising of certain manufacturers that they have made a new discovery and that they, and only they, have the ideal ophthalmic lenses are false.

George H. Stine.

Cowan, A. **Some factors concerned in the correction of aphakia.** Sec. on Ophth., Amer. Med. Assoc., 1934, 85th

session, p. 100. (See Amer. Jour. Ophth., 1935, v. 18, Feb., p. 182.

Eggers, H. **Power of ophthalmic lenses.** Arch. of Ophth., 1934, v. 12, Nov., pp. 753-764.

This review explains how the power varies with the contour and thickness and the distance of the lens from the eye. The variations of the principal points in the different types of lenses and the importance of vertex values are well shown by diagrams. Discrepancies in the neutralization of lenses are explained in a similar way.

J. Hewitt Judd.

Ferree, C. E., and Rand, G. **Intensity of light in relation to the near point and the apparent range of accommodation.** Amer. Jour. Ophth., 1935, v. 18, April, pp. 307-318.

Fischer, F. P. **Refraction changes in diabetes mellitus.** Arch. f. Augenh., 1934, v. 108, June, p. 422.

The author assumes that the transitory myopia and hyperopia arise from changes in permeability of the lens. The normal lens has a very small amount of NaCl. In case the lens becomes opaque the amount of this salt increases considerably, and swelling of the lens causes the change in refraction. Increased permeability of a lens still clear could be practically determined in case of transitory myopia by the sodium nitroprusside reaction in the aqueous. The cystein and glutathione which give the positive reaction could only have entered from the lens by increased permeability.

R. Grunfeld.

Gramont, Armand de. **A differential optometer.** Bull. Soc. Franç. d'Opht., 1934, 47th year, pp. 57-61.

The author describes an instrument for measuring the refractive powers of the eye in the different meridians. Two tubes with their illuminated objects are used, and by means of mirrors the images are superimposed. One tube is fixed while the other can be turned through the various meridians. The corresponding refractive powers are estimated by adjustment of the focus of the movable tube.

P. J. Leinfelder.

Granit, R., and Therman, P. O. **Excitation and inhibition in the retina and in the optic nerve.** Jour. of Physiology, 1935, v. 83, Feb. 9, pp. 359-381.

This highly technical description of physiologic experimentation is based upon analysis of the retinal action potential elicited by "white light" in dark and light adapted frogs' eyes. The various components and phases of the retinal response are correlated with events in the optic nerve, using a large Hungarian frog.

Harms, Heinrich. **Observations on the rolling of the eyes in near vision, its comparative measurement through the method of after images and the location of the subjective vertical.** Graefe's Arch., 1935, v. 133, p. 231.

Most of the measurements were made on the funnel haploscope of Tschermak. Inclination of the upper end temporalwards is called disclination, and that nasalwards is conclination. A disclinatory rolling in near vision was noted in cases of asymmetric convergence. The left eye showed greater disclination than the right. Perception of the vertical in this disclination for near does not usually correspond with the original functional longitudinal median section of the eye, but the subjective vertical shows less outward deviation. The demonstrated plasticity in localization of the vertical indicates no contradiction in stability of spatial value or congruity of the retinae.

H. D. Lamb.

Hartung, Hanus. **Investigations in color asthenopia.** Klin. M. f. Augenh., 1935, v. 94, Jan., p. 21.

Hartung examined in light adaptation sixty-three "normal" students who proved to be color-efficient in reading the plates of Stilling and Ishihara. They were then tested with the anomaloscope of Nagel. Forty-two were normal, the others showed different grades of color asthenopia, whereby the conditions of luminosity of the colors in fatigue were

considerably altered. The investigations indicate that tests of railway employees and aviators demand greater care than previously used. C. Zimmermann.

Heinonen, O. **Further studies in school myopia.** Acta Ophth., 1934, v. 12, pt. 1-2, p. 110.

Among 20,000 school children, the 244 myopes found at seven to eight years of age were classified relative to their social and educational background. The tables show a slightly greater predominance of low grade and moderate myopia in children of cultured parentage. The author attributes this difference to heredity, which he believes is the dominant factor in the development of myopia. Whether excessive use of the eyes for near work acts as the provocative factor to inherited predisposition cannot be determined from this study.

Ray K. Daily.

Kelly, E. L., and Miles, W. R. **Demonstration unit for patterns of apparent movement.** Amer. Jour. Psychology, 1934, v. 46, July, pp. 475-477.

With two illustrations, a description is given of a technique for demonstrating apparent movement before a group of students in such a way that the movement can be integrated into various patterns.

Kissin, P., and Eidelmann, B. **The pseudoisochromatic plates of Stilling, Nagel and Ishihara by natural and artificial lighting.** Graefe's Arch., 1935, v. 133, p. 298.

The Ishihara tests are very sensitive and are very nearly as valuable as Stilling's, which, however, are the most sensitive and permit detection of the mildest disturbances of color perception. The tests of Nagel are the least sensitive, and with them accurate determination in many cases requires considerable experience. H. D. Lamb.

Law, F. W. **The refractive error of twins.** Brit. Jour. Ophth., 1935, v. 19, Feb., p. 99.

Eight identical and three dissimilar twins are discussed. Of the eight identical cases four were squinters. The numbers are admittedly small, but it is suggested that these conclusions may be drawn: (1) Pairs of identical twins by no means always have identical refraction. (2) The refraction in identical twins is alike at least twice as often as in brothers and sisters of the same family born at different times. (3) The incidence of strabismus is higher in twins than in sibs of different ages. It occurs sometimes in only one member of the pair, but far more commonly in both members, and then is of the same nature and direction in both.

D. F. Harbridge.

Lopez Enriguez. **Optical magnification in general.** Bull. Soc. Franç. d'Opht., 1934, v. 47, pp. 46-57.

Magnification depends not alone upon the size of the visual angle and the projection of the image, but, according to the author, upon the relation between the size of the object and the apparent size of the image measured at the plane of projection.

P. J. Leinfelder.

Luckiesh, M., and Moss, F. K. **Fatigue of convergence induced by reading as a function of illumination intensity.** Amer. Jour. Ophth., 1935, v. 18, April, pp. 319-323.

Oloff, Hans. **Congenital blue anomalous trichromasia (tritanomaly).** Klin. M. f. Augenh., 1935, v. 94, Jan., p. 11.

Oloff reports for the first time a congenital anomaly of the blue sense in a woman aged thirty-six years, whereas the three cases encountered by Engelking occurred in men. Normal or even more than normal sensitiveness for yellow existed. Probably in congenital tritanomaly, as in protanomaly and deuteranomaly, we have to recognize different forms of disturbance of blue-yellow discrimination.

C. Zimmermann.

Ostwalt, F. **New punctate lenses.** Bull. Soc. Franç. d'Opht., 1934, 47th year, pp. 36-45. (See Amer. Jour. Ophth., 1934, v. 17, Oct., p. 976.)

Pflugk, Albert. **New methods of research in the knowledge of accommodation. The distensibility of the zonule and lens capsule.** Communication 4. Graefe's Arch., 1935, v. 133, p. 339.

Loading the zonule at the ciliary body with 100 mg. leads in man to a distinctly visible drawing away of the lens capsule from the lens contents. By use of 200 to 300 mg. the pull on the lens capsule is transmitted as far as the place of insertion of the zonular fibers in the anterior capsule. Slight yielding, followed by incipient flattening at the anterior pole of the lens, requires a load of several grams. This testing of Helmholtz' theory of accommodation was undertaken in two human lenses, one gorilla lens, and a large number of lenses of horses, cattle, calves, pigs, dogs, and cats. H. D. Lamb.

Polack, A. **Color vision and its anomalies.** Bull. Soc. Franç. d'Opht., 1934, 47th year, pp. 401-403. (See Amer. Jour. Ophth., 1934, v. 17, July, p. 652.)

Pressburger, E., and Sommer, I. **The effect of labyrinthine stimulation on the visual field.** Graefe's Arch., 1935, v. 133, p. 352.

Among twenty-eight individuals tested, twelve had normal conditions of the ears. These were submitted to the galvanic current by means of an electrode held behind each ear. The visual field was taken before the experiment, during passage of the galvanic current from one ear to the other, after irrigation of the ears with cold water, and during conduction of a faradic current through the skull. The galvanic current produced in one or both eyes concentric contraction of the visual field. With strong stimulation by the galvanic current this contraction was absent. It was probably due to stimulation of the labyrinthine center in the medulla oblongata and of the cortical center for the labyrinth in the temporal lobe. Through the association fibers of the cortex, labyrinthine stimulation radiates to other centers including the cortical visual center. The concentric contraction of the visual field can only be explained by an influence on both cortical visual centers. H. D. Lamb.

Shaad, D. J. **Binocular brightness summation in dark adaptation.** Arch. of Ophth., 1934, v. 12, Nov., pp. 705-708.

The author summarizes the literature and reports the results of experiments conducted with a Nagel adaptometer so arranged as to give the monocular and binocular threshold values for light stimuli of a two-degree visual angle. For five observers, individual differences were noted, but summation, as shown by the lower binocular thresholds, was present in each instance when corresponding points of the two eyes were stimulated. No summation was present when nonidentical areas were stimulated. It was found that the absolute difference between monocular and binocular thresholds became progressively smaller as the size of the stimulus was increased.

J. Hewitt Judd.

Tron, E. **The optical fundamentals of anisometropia and isometropia.** Graefe's Arch., 1935, v. 133, p. 211.

Among twenty-two cases of anisometropia, in which the difference in refraction between the two eyes amounted to between 2.0 and 13.0 D., measurements were made with Tscherning's ophthalmophakometer. In addition to differences in axial length of the two eyes there were also differences in the refraction of the cornea, the lens, and the entire dioptric apparatus; corneal fifteen times, lenticular fourteen times, and of the entire eye eleven times. The axial length of the two was different in nineteen cases. The lens is of greater significance in the occurrence of anisometropia than is the cornea. Anisometropia may occur in any combination of axial length and refraction. Refraction anisometropia is the rarest: it occurred twice among the twenty-two cases studied. Axial anisometropia and anisometropia of mixed origin were observed eleven and nine times respectively.

H. D. Lamb.

Tschermak-Seysenegg, Armin. **The leucoscope for investigation of the par-**

tially color blind. Graefe's Arch., 1935, v. 133, p. 410.

The apparatus employed for testing partially color-blind individuals is the author's modification of Hering's leucoscope, which combines the light from three colored lenses so that to the red or green ground-light either a yellow or blue light may be reflected in such amount that to the red-green-blind individual the resulting red or green mixture appears colorless. For investigation of the rare yellow-blue blindness there is used a yellow or blue ground-light to which a red or green light is added in such amount that the yellow or blue mixture appears colorless to the individual with yellow-blue blindness. The author uses a modification of Hering's leucoscope and tests for partial color blindness by production of two colorless mixtures from two appropriate colored lights. H. D. Lamb.

Viallefont, H. **Clinical information furnished by entoptic vision.** Bull. Soc. Franç. d'Opht., 47th year, 1934, pp. 377-380.

Study of the entoptic phenomena can give valuable information in those cases in which ophthalmoscopic examination is not possible (cataract, corneal scars, synechia, and so on.)

P. J. Leinfelder.

Williamson-Noble, F. A. **Rising front bifocals.** Brit. Jour. Ophth., 1935, v. 19, March, p. 165.

This is a double bridge device, the vertical part of the bridge having two sleeves which permit the frame to rise so as to elevate the reading segments.

D. F. Harbridge.

4. OCULAR MOVEMENTS

Batignani, A. **Ophthalmoplegia from herpes zoster.** Boll. d'Ocul., 1934, v. 13, June, pp. 814-826.

A woman of sixty-six years was affected by marked edema of the left lids, typical zoster lesions of the skin of forehead and nose, corneal hypesthesia, exophthalmos with fixed eyeball, and total ophthalmoplegia. The paralytic symptoms rapidly disappeared at the end of the acute stage of the skin lesions. The writer mentions the different theories on the etiology and pathogenesis of eye-muscle paralysis in herpes zoster, and assumes that in his case it was due to spreading of the inflammatory process to all motor nerves connected with the eye, the exopthalmos resulting from muscular atony. (Bibliography.) M. Lombardo.

Berens, Conrad. **A test for fusion and a fusion spectacle.** Amer. Jour. Ophth., 1935, v. 18, Feb., p. 157; also Trans. Sec. on Ophth., Amer. Med. Assoc., 1934, 85th session, p. 287.

Bielschowsky, A. **Lectures on motor anomalies of the eyes: 1, physiologic introduction.** Arch. of Ophth., 1934, v. 12, Dec., pp. 805-818.

The two eyes should be considered as halves of a single organ as regards the motor apparatus as well as the visual, since every motor innervation arising from the cortical centers flows equally to both eyes, causing the associated muscles to contract and relax. However, although these movements are made almost automatically, they are not true reflexes and hence we have to deal with anomalies of innervation as well as anomalies of the position of rest. These are discussed in detail with especial attention to alternating hyperphoria. J. Hewitt Judd.

Bogaert, L. **Recurrent ophthalmoplegia.** Acta Ophth., 1934, v. 12, pt. 3, p. 191.

This is a review of the literature with reports of three clinical cases. (Illustrations.) Ray K. Daily.

Borel. **Postluetic malposition of the eyes.** Bull. Soc. Franç. d'Opht., 47th year, 1934, pp. 404-411.

The author reports the case of a patient who after apoplexy had paralysis of the superior recti muscles and deviation of both eyes downward. One-half of the cases of vertical deviation of the eyes occur in luetics, and spasm of the antagonistic muscles is present. The localization of the lesion is not established. P. J. Leinfelder.

Brockmeyer, G. **Spasmus nutans in children.** Zeit. f. Augenh., 1935, v. 85, Jan., p. 121.

In fifteen children nodding of the head with or without nystagmus was observed. Chiefly the condition developed during the dark months of the year and in children who were kept in dark quarters. In seven of them there was also hyperopia, and in three children this was associated with strabismus. The actual etiology is not clarified by the author's observations. The following four factors must be considered in theoretical explanation: labyrinthine stimulation, illumination, degree of irritability of the labyrinth, and sensitivity of the light receptors.

F. Herbert Haessler.

Davidson, M. **A Simple device for measuring stereopsis.** Amer. Jour. Ophth., 1935, v. 18, April, pp. 356-359.

Feldman, J. B. **A modified stereoscope.** Amer. Jour. Ophth., 1935, v. 18, April, pp. 360-361.

Gifford, S. R. **Some notes on the treatment of strabismus.** Brit. Jour. Ophth., 1935, v. 19, March, p. 148.

Complete examination including refraction is essential, and full correction is prescribed, although it may be reduced if not tolerated in concomitant convergent squint. Little can be expected from corrective refraction in divergent squint. The author expresses a healthy skepticism as to monocular occlusion. Paralytic squint and pseudostrabismus are not suitable for orthoptic training. Cases of accommodative strabismus usually have a fairly high hyperopia, correction of which with lenses yields marked improvement. Fusion training hastens recovery but is not always necessary.

Strabismus due to defective fusion, cases with amblyopia, those associated with anisometropia, and cases with muscular abnormalities are discussed in relation to the benefits derived from orthoptic training. Very satisfactory results have been obtained in a considerable percentage of cases, especially where deviation was less than 20 or 25 degrees. Orthoptic training should be under proper supervision. If after fair trial of nonoperative measures, progress is at a standstill, operation should be advised regardless of age, but the operative technique should be suited to the particular type of squint.

D. F. Harbridge.

Guibor, G. P. **Practical details in the orthoptic treatment of strabismus.** Arch. of Ophth., 1934, v. 12, Dec., p. 887 also Sec. on Ophth., Amer. Med. Assoc., 1934, 85th session, pp. 231-243.

A classification of the types of squint is presented together with an outline of the treatment based on this. This includes correction of refractive errors found under atropin, overcoming suppression, the production of binocular perception and superposition, fusion and stereopsis, and the training of fusion amplitude and of duction power. The results in this group are compared with a group treated only by refraction and atropinization or occlusion of the fixing eye. Orthoptic training produces maximum recovery from squint in the first six months and in the low degrees of squint. (Photographs, charts, discussion.) J. Hewitt Judd.

Lijo Pavia, J., Dusseldorp, M., and Durando, S. A. **Semisurgical correction of squint with myocampsis.** Rev. Oto-Neuro-Oft., 1934, v. 9, Oct., p. 318.

The results of myocampsis in sixty-five cases are summarized as follows: The amount of shortening effected varies between nil and twenty degrees, with an average of 5.5 degrees. Occasionally the primary effect disappears rapidly, presumably because of the muscle slipping out of the ring, leaving only conjunctiva and capsule in its grasp. In eight cases tenotomy was done simultaneously, and in ten cases subsequently, to achieve the necessary correction. The simplicity of the operation is offset by the inflammatory reaction and the insignificant correction. (Illustrated.) M. Davidson.

Lordan, J. P. **Orthoptic and surgical management of strabismus.** Arch. of

Ophth., 1934, v. 12, Dec., pp. 843-849.

This report is based on the results in 60 cases of strabismus, 40 monocular convergent, 5 monocular divergent and 15 alternating convergent. Parallelism was obtained in 55 cases, first degree fusion in 6, second degree in 10, and third degree in 24. No determination was made in 18. Twenty cases were treated with orthoptic exercises twice weekly for an average of five months. In this group third degree fusion was obtained in 7 out of 12 patients with monocular squint, 4 out of 6 with alternating squint and 1 out of 2 with divergent squint. It was found that with the eyes in or near parallelism and a visual acuity of 20/49 or better, third degree fusion might be expected and second degree even with vision of 20/65. Ninety-one operations were necessary, an average of 1.8 per patient and in 74 the O'Connor cinch shortening operation was used alone or with one of four types of tenotomy. The author prefers the central type of tenotomy.

J. Hewitt Judd.

Panico, E. **Concomitant strabismus and facial asymmetry.** Boll. d'Ocul., 1934, v. 13, May, pp. 517-520.

Asymmetry of the bones and soft parts of the face was found very frequently in patients affected by concomitant strabismus. Anisometropia is a true symptom of facial asymetry. The writer thinks that disease in infancy may determine deficient function of nerves supplying the muscles of the face and eyes, provoking underdevelopment of these muscles. Intercurrent disease just before strabismus manifests itself may determine loss, even temporary, of binocular vision and the faculty of fusion so that deviation is established. M. Lombardo.

Petragnani, V. **The myocampter of Lacarrère in the surgical treatment of strabismus.** Boll. d'Ocul., 1934, v. 13, June, pp. 808-813.

The operation of myocampsis (myos-muscle, campsis-doubling) and the myocampter, the instrument devised by Lacarrère, are described. Myocampsis of one muscle was sufficient to correct a deviation of fifteen perimetric degrees. In two cases of convergent strabismus of more than thirty degrees the operation had to be supplemented with tenotomy of the external rectus muscle in order to get a satisfactory result. (Four figures.) M. Lombardo.

Rodin, F. H. **A family of squinters.** Arch. of Ophth., 1934, v. 12, Dec., pp. 874-876.

Strabismus in only the three youngest children, aged eleven, eight and six years, occurred in a family of seven. The onset was earlier and the degree greater with each succeeding child; and the side alternated, right, left, and right convergent squint respectively. A similar family was previously reported. These suggest that possibly the age of the parents, especially the mother, is a factor in the etiology of strabismus.

J. Hewitt Judd.

White, J. W. **Routine muscle examination in its practical application.** Trans. Sec. on Ophth., Amer. Med. Assoc., 1934, 85th session, p. 160.

It is the author's opinion that what is needed in muscle work is not more theories nor more tests, but a more practical application of those we have. Routinely one should determine the deviation for distance and for near, the convergence near point, and deviation in the six cardinal fields. Tests not made routinely include the red glass, Maddox rods, Stevens' phorometer, equilibrium, diplopia on the tangent curtain, prism divergence and convergence, screen-comitance, fusion, and tropometer. The author considers the screen test most valuable. (Five figures, discussion.) George H. Stine.

White, J. W. **When and how should one operate for convergent strabismus?** Arch. of Ophth., 1934, v. 12, Nov., pp. 699-704.

Irrespective of age, strabismus should be corrected by operation when no or an insufficient reduction is obtained by nonoperative means. The proper operation can be selected only after consideration of the following factors: the amount of hypermetropia and the effect

of its correction on the deviation; the amount of the deviation for distance and near in the six cardinal fields; the amount and character of the ductions and the importance of any vertical deviation as determined by the screen comitance test; and the amount and character of the convergence near point. Unless the lateral strabismus is much greater than the vertical and is not affected by correcting the vertical deviation by prisms, the vertical deviation should be corrected first. An illustrative case is presented. J. Hewitt Judd.

5. CONJUNCTIVA

Gabriélidès, C., and Joannidès, G. **Isolation of an atypical corynebacterium from the human conjunctiva.** Ann. d'Ocul., 1935, v. 172, Feb., pp. 148-152.

In a cataract patient a test bandage was applied prior to operation. On removal of the bandage a mild conjunctivitis was found. Culture of the secretion showed a Gram-positive polymorphic corynebacterium. This organism produced mild conjunctivitis when placed on the human conjunctiva. When injected into the vitreous of a rabbit severe uveitis resulted. The cultural characteristics of the organism are described in detail.

John C. Long.

Gowen, G. H. **Temperature changes in the conjunctiva in relation to application of heat and cold to the skin.** Amer. Jour. Ophth., 1935, v. 18, April, pp. 331-333.

Lijo Pavia, Jr., and Dusseldorp, M. **Papulonecrotic acne of conjunctiva and cornea.** Rev. Oto-Neuro-Oft., 1934, v. 9, Nov., p. 363.

Biopsy showed the epithelium intact but separated from the corium by a space traversed by fine fibrils. The corium presented lymphocytic infiltration and occasional necrotic spots, but no tubercle bacilli. The case improved under phototherapy and tuberculin treatment. M. Davidson.

Lindner, K. **Research on inoculation of trachoma with paratrachoma of the new-born (inclusion blennorrhea).** Graefe's Arch., 1935, v. 133, p. 479.

The virus that produces the inclusion blennorrhea of the new-born as well as the related infections of the female and male genitals is identical with the virus of trachoma. Trachoma was originally a purely genital infection. For these infections which he considers related to trachoma the author proposes the designation "paratrachoma." Paratrachomatous conditions of the conjunctiva differ from trachoma in never producing pannus or considerable cicatrization and in usually healing in three to six months without after effects.

In twenty-two eyes of twenty-one cases of pronounced trachoma with pannus, massive superinfection was done with epithelial scrapings from the conjunctiva of a new-born in the acute stage of inclusion blennorrhea. A very slight clinical result of the inoculation was observed in the majority of the cases and a questionable or entirely negative one in a third more of them. Older or almost healed cases of trachoma showed definite immunity against infection with paratrachoma. When the conjunctivae of two cases with folliculosis were inoculated with material from acute inclusion blenorrhea, a rapid and pronounced clinical result was obtained. H. D. Lamb

MacCallan, A. F. **Rôle of the gonococcus in purulent ophthalmia in warm climates.** Arch. of Ophth., 1934, v. 12, Dec., pp. 819-823.

Basing on investigations in Egypt the author finds that while the annual rise of temperature begins during March and continues until June, the peak of gonococcic infection is not reached until September, when it is found in sixty-nine percent of all cases. During the hot weather trachoma predisposes to this infection, but pannus affords some protection against ulceration. The organisms of gonococcic conjunctivitis and urethritis are identical. With temperatures of about 40° C. (104° F.) the gonococcus ceases to flourish. The incidence of blindness increases with age. J. Hewitt Judd.

Morelli, E. **Lymphoid hypertrophy of the conjunctiva with ectasia of lymphatic vessels.** Boll. d'Ocul., 1934, v. 13, May, pp. 670-682.

In patients from seventeen to fifty-four years the writer reports four cases showing on a pale conjunctiva numerous pearl-like proliferations of different size. The writer thinks these lesions result from some form of irritation, causing hyperplasia of lymphoid tissue of the conjunctiva, with ectasia of lymphatic vessels. (Three figures.)

M. Lombardo.

Nizetic, Zdravko. **Conjunctivitis due to bacillus proteus vulgaris.** Ann. d'Ocul., 1934, v. 171, Dec., pp. 998-1004.

Severe persistent conjunctivitis followed gonorrheal ophthalmia in a man of twenty-six years. Bacillus proteus vulgaris was repeatedly demonstrated in the secretions, at times in pure culture. The putrid odor of the secretions was so marked that the patient had to be isolated. Various forms of therapy including silver nitrate applications, milk injections, and autogenous vaccines were ineffective. Prompt improvement followed the use of bacteriophage. It was thought that the pre-existing gonorrhea had rendered the conjunctiva vulnerable to Bacillus proteus.

John C. Long.

Oberhoff, Kurt. **The histogenesis of nevus of the bulbar conjunctiva.** Arch. f. Augenh., 1933, v. 108, Dec., p. 194.

Histologic studies carried on by the author indicate that the nevus cells of the bulbar conjunctiva are derived from embryonic tissue cells which are bound to capillary walls.

R. Grunfeld.

Rieger, Herwigh. **Metastatic epibulbar subconjunctivitis in epidemic parotitis.** Graefe's Arch., 1935, v. 133, p. 505.

In a twenty-one-year-old man and a thirty-one-year-old woman with mumps, subconjunctivitis of both eyes occurred in the second week of the disease. The characteristic changes were intense injection of the episcleral blood vessels and mild edema of the bulbar conjunctiva, lasting at most two weeks.

H. D. Lamb.

Rostkowski, Louis. **Forceps for Denig's operation.** Arch. d'Opht., 1935, v. 52, Feb., p. 115.

This is a forceps with two fine semicircular blades, for inserting the graft obtained from the mucous membrane of the mouth.

Thygeson, P. **Etiologic diagnosis of conjunctivitis.** Arch. of Ophth., 1934, v. 12, Nov., pp. 676-688: also Sec. on Ophth., Amer. Med. Assoc., 1934, 85th session, p. 134.

The author presents a simplified technique, illustrated by tables, for routine diagnosis of the common conjunctival inflammations. The film and culture technique is described in detail and the bacteria are differentiated in tables according to their cultural and morphologic characteristics. Special consideration is given to lacrimal conjunctivitis, vernal catarrh, inclusion conjunctivitis, inclusion blennorrhea, adult inclusion conjunctivitis, trachoma, and inclusion bodies. Therapeutic considerations derivable from bacteriologic examination are discussed. The author advocates the preparation of sets of slides illustrating the conjunctival bacteria for the purposes of teaching and reference. (Discussion.)

J. Hewitt Judd.

Vazquez Barrière, A. **Endogenous gonorrheal conjunctivitis and keratitis.** Arch. de Oft. Hisp.-Amer., 1935, v. 35, Jan., pp. 15-25.

Mild conjunctivitis and keratitis occurred in a patient with acute gonorrheal urethritis complicated with arthritis. Microscopic examination of conjunctival secretion detected the specific germ. The condition was cured without sequela by local applications of two percent solution of silver nitrate, followed by instillations of argyrol and irrigations with a solution of cyanide of mercury; and by an intramuscular injection of milk, with marked rise in temperature. The author believes the gonococcus arrived in the subconjunctival

spaces through the blood stream and afterward passed into the conjunctival cul-de-sac through the epithelium. The epithelium showed mild lesions of the phlyctenular type. (Bibliography.)

Ramon Castroviejo.

6. CORNEA AND SCLERA

Caramazza, F. **The etiology of keratoconus and the use of contact glasses.** Boll. d'Ocul., 1934, v. 13, May, pp. 538-575.

Fifteen cases of keratoconus, eleven in females, were studied by the writer. The age of the patients varied from fifteen to twenty-seven years. The sensibility of the cornea was reduced at the conus in a few cases. The superficial opacity of cicatricial aspect seen at the apex, and the thin superficial striations going from the conus to the periphery, are considered by the writer as secondary changes. In a number of cases the Fleischer ring of olive color was seen, formed of very fine granules of pigment probably located in the epithelial cells. From anamnesis, general clinical examination, and pharmacodynamic tests the author excludes any connection between keratoconus and the glands of internal secretion. He emphasizes the use of contact glasses for improvement of vision. (Bibliography.)

M. Lombardo.

Gasteiger, H. **The reticulo-endothelial system of the eye with special consideration of the cornea.** Arch. f. Augenh., 1934, v. 108, June, p. 408.

Eight rabbits received a large amount of one percent trypan blue and five percent lithium carmine chiefly by intravenous but partly by subcutaneous injection. Afterward a swelling of the cornea was produced by passing a discission needle into the anterior chamber. The swelling facilitated penetration of the dye into the cornea. Histologic examination proved the presence of reticulo-endothelial cells in the cornea under normal, noninflammatory conditions. It is surmised that these cells are identical with Maximow's stationary wandering cells. Reticulo-endothelial cells are also present in the conjunctiva, sclera, and uvea, but are absent from the retina, lens, and vitreous.

R. Grunfeld.

Hörn Caston, J. A. **Marginal degeneration of the cornea.** Arch. de Oft. Hisp.-Amer., 1935, v. 35, Feb., pp. 74-88.

The author believes that the initial lesion in this case was a gerontoxon, which underwent degeneration under the influence of prolonged irritation of the eye. Etiology, pathogenesis, pathologic anatomy, and treatment are discussed in detail. (Three illustrations and bibliography.)

Ramon Castroviejo.

Jaensch, P. A. **Fatty degeneration in the eye. 2. Fatty degeneration of the cornea and sclera. Anatomic findings in scleritis.** Graefe's Arch., 1935, v. 133, p. 361.

Histologic examination of many eyes proves that corneal wounds and scars may show a content of fat, depending essentially upon immigration of fat-containing or fat-storing cells which are frequently derived from hypopyon or from the corneal tissue itself. Positive although not entirely uniform relations exist between the amount of the fatty degeneration and the age of the wound or the time between the injury and the enucleation. In corneal ulcer and leucoma the amount of fat varies considerably. The deeper the vessels extend into the cornea, the less is the fatty degeneration. In three eyes with inflammation of the sclera, an exceptionally pronounced fatty degeneration could be demonstrated in sharply circumscribed foci, occupying the innermost layers of the scleral nodules of inflammation. Fat storage was observed at times in the eyes of young children with serious disease. H. D. Lamb.

Ortiz, J. M., Jr. **Ionization with iodine and salicylic acid and its clarifying value in corneal opacities.** Arch. de Oft. Hisp.-Amer., 1935, v. 35, Jan., pp. 25-35.

Twenty-nine cases of corneal opacity were treated according to Cantonnet's technique of ionization with iodine and

salicylic acid. The author claims to have obtained 1/10 or more improvement of vision in fifty percent of the patients treated with potassium iodide; improvement in thirty percent of the cases treated with sodium salicylate; and improvement in almost one-hundred percent of the patients treated with a combination of these drugs.

Ramon Castroviejo.

Vasquez Barrière, A. **Endogenous gonorrheal conjunctivitis and keratitis.** Arch. de Oft. Hisp.-Amer., 1935, v. 35, Jan., pp. 15-25. (See Section 5, Conjunctiva.)

Yokota, Y. **Experimental observations on luetic parenchymatous keratitis with special reference to the mode of invasion by the exciting agent.** Graefe's Arch., 1935, v. 133, p. 383.

The experiments were carried out with a strain of spirochete obtained from a human condyloma latum and passed through eighty generations of rabbits by inoculation into the testis. The spirochetes thus obtained were usually injected into the rabbit's anterior chamber, rarely into the cornea, testis, or conjunctival sac, under the conjunctiva, or behind the globe. The cases with positive results could be divided into three groups. (1) In twenty-seven cases the inflammatory opacity in the cornea regularly extended from the limbus. (2) In ten cases the inflammatory process was characterized by development of a granuloma on the cornea. (3) In eleven cases, inoculated only into the anterior chamber, the resulting keratitis developed a disc-shaped opacity occupying the central part of the cornea. In every form of experimental keratitis, the corneal limbus is the chief portal of invasion by the organisms into the cornea. H. D. Lamb.

7. UVEAL TRACT, SYMPATHETIC DISEASE, AND AQUEOUS HUMOR

Aliquò-Mazzei, A. **Clinical, pathologic, and histochemical contribution to "xanthomatosis bulbi".** Boll. d'Ocul., 1934, v. 13, June, pp. 766-807.

Among other symptoms, a man of twenty-nine years who six years before had had a traumatic iridocyclitis of the right eye, showed a yellowish mass filling the lower part of the anterior chamber, and covering the iris a film of organized exudate which contained numerous iridescent scales. The author gives the histologic and histochemical description of the enucleated eye and concludes that xanthomatosis bulbi is a rare affection of a blind eye following a long slow inflammatory process, and characterized by deposit of fatty substances. It appears usually after the fortieth year. Local factors are hypertension and intraocular hemorrhage. The fatty substances are fatty acids, cholesterin, ethers of cholesterin, and phosphates. (Bibliography, ten figures.)

M. Lombardo.

Bresgen, Carl. **Bone formation in the choroid.** Zeit. f. Augenh., 1935, v. 85, Feb., p. 217.

A blind eye enucleated because of unbearable pain in a diabetic was found to have bone in the choroid. No cicatricial membrane or other sign of inflammation was found. In this respect, the author's findings differ from all others recorded in the literature. He suggests that the bone formation may have started in the calcified media of some of the larger choroidal vessels. Calcification with occasional ossification in the media of the larger vessels elsewhere in the body is not uncommon in diabetics. F. Herbert Haessler.

Brown, A. L. **Chronic uveitis. Bacteriologic and immunologic considerations.** Arch. of Ophth., 1934, v. 12, Nov., pp. 730-750; also Sec. on Ophth., Amer. Med. Assoc., 1934, 85th session, p. 111.

Experiments on rabbits showed the bactericidal power of the aqueous and vitreous to be negligible, since they did not interfere with intraocular growth of streptococci. When replaced by physiologic solution of sodium chloride the results were similar but autogenous blood serum or whole blood within the eye inhibited the growth. Other experiments showed that ocular inflammation developed rarely from remote foci of infection unless the eye had been previously sensitized by a toxic filtrate of the

organism, and the author believes that this preparation of the tissue by sensitization more nearly explains the clinical manifestations than the theory of specificity of the organisms. Experimental data are presented to show that the virulence of the organism for uveal tissue is apparently diminished by its association with this tissue. Blood cultures are of little value, as in eighty-one patients with irititis and uveitis they were negative except in two showing marked generalized inflammations. Bacteriologic examinations of aqueous and uveal tissue from cases with chronic uveitis and recurrent iridocyclitis were negative, and indicated that these reactions occurred without the presence of the organism in the eye. The author concludes that these cases are due to sensitization of the uveal tract and repeated activation by a specific antigen. (Discussion.)

J. Hewitt Judd.

Bunge, E. **Bilateral iridocyclitis and poliosis.** Arch. f. Augenh., 1933, v. 108, Dec., p. 212.

Both eyebrows and cilia of the left upper eyelid of a forty-year-old woman became grey simultaneously with the development of optic neuritis. Later iridocyclitis developed with richly pigmented posterior synechiae, and pigment dust upon the anterior capsule of the lens and upon Descemet's membrane. Then the hair of the whole head, the axilla, and the pubes became grey. The cause of the depigmentation is discussed. Anaphylaxis is rejected, for in this case a longer period should have elapsed before depigmentation developed. Toxins, hormone action, and central regulatory disturbances are considered. The importance of heredity is emphasized.

R. Grunfeld.

De Cristofaro, U. **Contribution to the knowledge of spontaneous cysts of the iris.** Boll. d'Ocul., 1934, v. 13, May, pp. 640-669.

An old cystic formation giving recently symptoms of glaucoma was removed by iridectomy from the inferior external quadrant of the right iris of a woman of twenty-four years. Histologic examination of the excised tissue showed it to be formed from multiple cysts developed in the stroma of the iris, and lined by epithelial cells which did not pertain to the neighboring epithelial layers. The author thinks that the cystic formation was of congenital origin. (Bibliography, five figures, two in color.)

M. Lombardo.

Felsenthal, W. **Contribution to the pathology of sympathetic ophthalmia.** Ann. d'Ocul., 1934, v. 171, Nov., pp. 944-963.

Sympathetic ophthalmia developed in the right eye of a woman of forty-seven years one month after traumatic rupture of the sclera. The left eye appeared entirely normal with the biomicroscope. The injured eye was enucleated. The histologic appearance was typical of sympathetic ophthalmia. Such a finding with no involvement of the uninjured eye is rare. In this case an inflammatory nodule was found in the traumatized iris tissue. This nodule corresponds to Redslob's "chancre of inoculation". It is considered that this "chancre" represents the primary site of entry of the etiologic agent. (Discussion.)

John C. Long.

Genet, L. **Paralysis of accommodation without pupillary involvement.** Bull. Soc. Franç. d'Opht., 1934, 47th year, pp. 176-180.

Total loss of accommodation gradually developed in a child during a period of eight months. The pupillary reactions remained normal. Physical examination showed no abnormalities, nor was there a history of diphtheria, botulism, encephalitis, or syphilis. The condition was unchanged during the four years of observation. The author feels that this case indicates that there is a supranuclear center for accommodation.

P. J. Leinfelder.

Lijo Pavia, J. **Diffuse sclerosis of choroidal vessels.** Rev. Oto-Neuro-Oft., 1934, v. 9, Nov., p. 359.

A case of diffuse sclerosis of the choroid in a young man of twenty-four years with very high myopia and a posi-

tive Wassermann is described. Improvement in vision was secured under antiluetic treatment, and such treatment is indicated even if lues is not proved in such cases. (Illustrated.)
M. Davidson.

Müller, H. K. **Aqueous and lens metabolism.** Arch. f. Augenh., 1933, v. 108, Dec., p. 41.

There is not enough proof to indicate that it is a ferment that decolorizes methylen blue in the aqueous. Neither heat nor freezing has any influence on the reduction time, nor does toluol hinder the discoloration. Deproteinized, acidified aqueous is still able to reduce methylen blue. Electrometric measurements indicate that in the aqueous there is a system by which the reduced phase may enter into the oxidized phase and vice versa. Shortly after naphthalin poisoning, and in cataractous eyes, the ability of the aqueous to reduce methylen blue vanishes. Its chemical and chemicophysical properties indicate that the reversible system is based upon vitamin C. R. Grunfeld.

Passow, A. **Artificially produced neurogenic heterochromia.** Arch. f. Augenh., 1933, v. 108, Dec., p. 137.

Demonstrating on eleven cases the author confirms his former statement that sympathetic heterochromia and complicated heterochromia are usually found combined with symptoms of status dysraphicus. The latter is due to dysraphy of the neural tube and has the following among other symptoms: sternum anomaly, kyphoscoliosis, difference in the size of the mammae and in pigmentation of the areolae, acrocyanosis, dystrophy of the upper extremities, tendency of the fingers to flexion, disturbance of sensibility.

The author was able to produce heterochromia in seven rabbits through sympathetic lesion at the age of eight to eighteen days. Heterochromia may be considered as a trophoneurotic disturbance and developmental arrest of the uvea and of pigment formation, due to lesion of the trophic fibers, while the Horner syndrome is caused by lesion of the motor fibers of the sympathetic at an early stage of development.
R. Grunfeld.

Petragnani, V. **Researches on "elective sensitization" of the eye."** Boll. d'Ocul., 1934, v. 13, May, pp. 618-639.

The author reports in detail an experiment to test the reaction of a rabbit eye when an antigen is injected in its anterior chamber or endovenously or subcutaneously. By using his diagnostic or phenolated "anatuberculin" in twenty-six rabbits, the author, among other conclusions, could exclude the so-called elective or anaphylactic sensitization theory. (Bibliography, eight figures.) M. Lombardo.

Schläpfer, Hans. **The nature of photophobia.** Zeit. f. Augenh., 1935, v. 85, Feb., p. 221.

Photophobia results from movements of the iris stimulated directly or consensually, but does not result from mere illumination of the iris or retinal tissue itself. This was demonstrated recently by Comberg, but had been settled twenty years ago by experiments of Vogt and Siegwart. F. Herbert Haessler.

Sjögren, H. **Drainage of the anterior chamber in inflammations of the anterior segment of the eyeball.** Acta Ophth., 1934, v. 12, pt. 3, p. 233.

In the Sabbatsberg hospital the following technique is used: A small incision into the anterior chamber is made with a keratome. A Pagenstecher spoon is introduced into the anterior chamber to protect the iris. With an electric cautery a burn is made in the middle of the anterior lip of the wound, against the underlying spoon. This procedure keeps the anterior chamber open for several days or even weeks. Four cases of late infection following Elliot trephining, three cases of infection following cataract extraction, and one case of ulcer with hypopyon show the favorable effect of this procedure on the clinical course of infections in the anterior chamber. Ray K. Daily.

Souter, W. C. **Iris changes by simple diascleral diaphanoscopy.** Trans.

Ophth. Soc. United Kingdom, 1934, v. 54, p. 146.

Iris holes were outlined by diascleral diaphanoscopy in various eye conditions such as iridocyclitis, herpes zoster, interstitial keratitis, diabetes, and tabes, and after ocular operations. A luminous ophthalmoscope with a cap or tube with a small aperture for the egress of light is used in a completely darkened room, after a minute or two for adaptation. A small pupil is necessary, and the light is pushed against the skin of the lower lid over the lower orbital edge.

Beulah Cushman.

Velhagen, K., Jr. **The effect of cholin bodies upon the iris muscle.** Arch. f. Augenh., 1933, v. 108, Dec., p. 126.

Experiments on isolated iris muscles show that the pupillary sphincter retains its ability to contract in response to the action of acetylcholin and carbaminoylcholin after having been atropinized. These drugs act upon the muscle itself, and stimulate the sphincter and the dilator equally. Experiments further disclose the fact that it is not necessary to claim a sympathetic-parasympathetic double innervation for the dilator muscle. R. Grunfeld.

8. GLAUCOMA AND OCULAR TENSION

Del Barrio, A. **Internal fistulization by sclerociliary iridencleisis in glaucoma.** Ann. d'Ocul., 1934, v. 171, Dec., pp. 977-998.

External fistulization operations for glaucoma are followed by late infection in about 5.5 percent of the cases. Some form of internal fistulization is desirable. Cyclodialysis would be ideal if the reduction in tension were permanent, but the ciliary body often becomes reattached to the sclera, blocking filtration. Del Barrio places a wick of iris between the anterior chamber and the suprachoroidal space. A scleral incision is made 5 mm. from the limbus, a spatula is carried into the anterior chamber as in cyclodialysis, and the iris is pulled out of the wound with a hook and the tip excised, leaving the iris incarcerated between sclera and ciliary body. In chronic simple glaucoma favorable results have been obtained in eighty-five percent of the cases. In secondary and absolute glaucoma the successful cases have been fifty percent.

John C. Long.

Evans, J. N. **Transient fluctuations in the scotoma of glaucoma.** Amer. Jour. Ophth., 1935, v. 18, April, pp. 333-347.

Fischer, F. P. **Concerning pharmacodynamic and osmotic hypotony.** Arch. f. Augenh., 1934, v. 108, June, p. 426.

Osmotic hypotony differs from pharmacodynamic hypotony in that the former can be entirely explained by physical laws, the latter not. Electrostatic measurements upon the living eye show that osmotic hypotonicity is connected with electric discharge, whereas pharmacodynamic hypotony is associated with positive electric charge of the iris against the aqueous. Further it was proved that dehydration causes a positive increase of the electropotential. All acids give a positive charge depending upon the H ion concentration, all bases give a negative charge depending upon the OH ion concentration.

The fall in pressure after injection of hypertonic solutions is only for a time due to osmotic equalization; the lasting effect is due to changes in permeability, with capillary insufficiency.

R. Grunfeld.

Gifford, S. R. **The therapy of Cook County Hospital: glaucoma.** Jour. Amer. Med. Assoc., 1934, v. 103, Nov. 17, p. 1537.

This is a good outline of the medical and surgical treatment of acute and chronic primary, secondary, and absolute glaucoma. George H. Stine.

Kiehle, F. A., and Pugmire, C. **Buphthalmos in identical twins.** Arch. of Ophth., 1934, v. 12, Nov., pp. 751-752.

The boys, aged six years, presented unilateral buphthalmos in opposite eyes. The condition was first noticed at the age of three months. In one the tension was controlled by trephining, but in the other enucleation was necessary.

J. Hewitt Judd.

Lacat, C. **The failure of iridectomy in glaucoma associated with choroiditis.** Bull. Soc. Franç. d'Opht., 1934, 47th year, pp. 292-296.

Glaucoma when occurring in previously inflamed eyes (interstitial keratitis, chorioretinitis) does not respond well to iridectomy but is improved by intravenous injections of cyanide of mercury. P. J. Leinfelder.

O'Connor, Roderic. **Peripheral iridotomy (Curran) in glaucoma.** Amer. Jour. Ophth., 1935, v. 18, Feb., pp. 146-148; also Trans. Pacific Coast Oto-Ophth. Soc., 1934, 22nd meeting, p. 158.

Onfray, R., Abeloos, and Suys. **Late results of corneoscleral fistulization in chronic glaucoma.** Bull. Soc. Franç. d'Opht., 1934, 47th year, pp. 297-307.

Basing upon experience with twenty-five cases the authors conclude that fistulization (Lagrange or Elliot) should be resorted to early in cases of chronic glaucoma. Indications are failure to respond to pilocarpin, tension above 25 mm. Hg with pilocarpin, loss of vision, and contraction of the visual fields. Reading vision is conserved in fifty percent, and vision for activity in eighty percent of the operated eyes.

P. J. Leinfelder.

Redslob, E. **Is primary glaucoma an inflammatory condition?** Ann. d'Ocul., 1935, v. 172, Jan., pp. 1-13.

In primary glaucoma it is not uncommon to find deposits of cells on the posterior surface of the cornea. These cells are lymphocytes derived from the iris and do not come from the ciliary body, as is commonly supposed. Apparently the presence of these cells on the cornea indicates stasis rather than inflammation. They are also found in cases of intraocular tumor. The retinal and choroidal hemorrhages seen in primary glaucoma also result from stasis. Blood is present in the canal of Schlemm in primary glaucoma, intraocular tumor, and very acute iridocyclitis. The various pathologic findings in primary glaucoma may be explained on the basis of vascular stasis alone.

John C. Long.

Szász, A. **The metabolism of the eye as influenced by medicaments.** Arch. f. Augenh., 1933, v. 108, Dec., p. 162.

The author arranges medicaments which affect eye-metabolism in three groups. In the first are those which stimulate the parasympathetic nerve endings and so metabolism: pilocarpin, eserin, arecolin, pelletierin, and yohimbin. In the second group belong atropin, scopolamin, and agarizin. These paralyze the parasympathetic nerve endings and thus cause indirectly a predominance of the sympathetic effect. In the third group belong adrenalin, ephedrin, glanduitrin, and ergotamin. Two phases have to be distinguished in the action of this group: first a strong stimulation of the sympathetic with vasoconstriction and retardation of metabolism; second a relaxation of the vessel walls, when by exhaustion of sympathicotonus the overeffect of the parasympathetic becomes manifest.

Acute glaucoma is caused by pathologic decrease or cessation of parasympathetic irritability. Its treatment consists in raising this irritability with pilocarpin or eserin. In glaucoma simplex sympathicotonus is overactive and causes slackening of metabolism. Its treatment consists in parasympathetic stimulation, or in inhibition of sympathicotonus in a roundabout way, increasing sympathicotonus until it becomes exhausted, with adrenalin, epinephrin, or ergotamin.

R. Grunfeld.

Trantas, A. **The incidence of glaucoma in Greece and in Turkey.** Bull. Soc. Franç. d'Opht., 1934, 47th year, pp. 277-291.

In Turkey the incidence of primary and secondary glaucoma is 2.35 percent, with 1.92 percent primary, while in Greece the proportion is 4.35 percent, with 3.69 percent primary. The author feels that the incidence of senile exfoliation of the anterior capsule is more frequent in the Greeks, and that it is perhaps responsible for the greater incidence of glaucoma. It occurs in 10.7 percent of nonglaucomatous senile eyes and in 45.64 percent of glaucomatous eyes. Edema of the cornea does not al-

ways occur in direct proportion to the intraocular tension. Corneal precipitates are frequent in glaucomatous and nonglaucomatous eyes.

P. J. Leinfelder.

9. CRYSTALLINE LENS

Amsler, M. **Familiar ectopia of the lens.** Bull. Soc. Franç. d'Opht., 1934, 47th year, pp. 181-186.

A family of nine persons, representing three generations, showed ectopia lentis in eight members. In those affected the visual acuity varied from 0.1 to 0.9, and the refraction was myopic except in one case. The displacement of the lens was not the same in all cases, but none was displaced inferiorly.

P. J. Leinfelder.

Arruga, H. **Necessary attributes of a capsule forceps for cataract extraction.** Bull. Soc. Franç. d'Opht., 1934, 47th year, pp. 205-210.

A capsule forceps is described and photographs shown. The necessary features are smooth, parallel, grooved blades which have a rounded inferior (capsular) surface. The blades should grasp evenly but not too tightly: a visiting card can be drawn through the closed blades. In holding the forceps the thumb and fingers should be near the center of the instrument, rather than near the grasping end.

P. J. Leinfelder.

Braun, R. **Concerning diabetic cataract and insulin therapy.** Klin. Woch., 1935, v. 14, Feb. 16, pp. 222-227.

The author reviews the literature since 1924 on this subject and adds his own observations. He concludes that diabetic cataract is not merely a consequence of disturbed osmotic equilibrium between lens and aqueous, or even of severe acidosis, but that factors as yet unknown play an important part. Intensive insulin therapy does not damage the lens but may even bring about regression of diabetic lenticular opacities.

Bertha Klein Moncreiff.

Braun, Reinhard. **Further investigations regarding the primary toxicity of the lens substance.** Arch. f. Augenh., 1934, v. 108, June, p. 341.

Experiments conducted on rabbits, on a cat, and on a dog prove that alcoholic and watery extracts of fresh and dried lens substances, respectively, cause a fall in blood pressure. This is shown not to be due to histamin or to acetylcholin. The author assumes that an unknown substance in the lens causes the fall in blood pressure. The noninfectious inflammation which is seen after cataract extraction may be caused by the toxic effect of retained lens substance.

R. Grunfeld.

Fischer, F. P. **Water binding, transparency, and permeability of the lens.** Arch. f. Augenh., 1933, v. 108, Dec., p. 80.

The author proves that the lens absorbs water by swelling and not by osmosis, since the amount of absorption differs in isonormal acids and bases, or in isomolecular salt and nonconductible solutions. With increased water absorption the refraction increases. The Tyndall effect is due to protein coagulation, which may be partly reversible, partly nonreversible, depending on the H and HO ion concentration in the fluid. The permeability of the lens differs according to which side of the lens has been chosen for the experiment.

R. Grunfeld.

Goldmann, Hans. **The origin of glassblower's cataract.** Ann. d'Ocul., 1935, v. 172, Jan., pp. 13-41.

The cataract of glass workers consists of a peculiar dehiscence of the fibers of the anterior portion of the lens and a disciform posterior polar opacity. The lens changes occur only after ten to twenty years of exposure to the furnaces and usually in workers over fifty years of age.

Goldmann implanted a gold-platinum thermopile in the eyes of rabbits and of one human subject and measured the temperature of various portions of the living eye when exposed to the radiations of a furnace. There was a marked elevation in temperature behind the iris and at the anterior surface

of the lens. Goldmann concludes that the increased temperature over long periods is sufficient to produce the typical lens changes and that the cataract is not due to ultraviolet rays nor to a specific action of a certain part of the infrared spectrum. John C. Long.

Müller, H. K. **Aqueous and lens metabolism.** Arch. f. Augenh., 1933, v. 108, Dec., p. 41. (See Section 7, Uveal tract, sympathetic disease, and aqueous humor.)

Müller, H. K., and Buschke, W. **Vitamin C in lens, aqueous, and blood in normal and pathologic lens metabolism.** Arch. f. Augenh., 1934, v. 108, June, p. 368.

Vitamin C is present in abundance in the lens and aqueous of many species of animals, other parts of their eyes having less of this vitamin. Its amount varies considerably in different species. The rabbit lens shows a diminished vitamin-C content with increasing age. It has been shown that the aqueous receives vitamin C from the lens. In cattle eyes with senile and complicated cataract the vitamin C of the lens and aqueous is diminished. Soon after acute naphthalin poisoning the vitamin-C content of the aqueous, but not of the lens, was found diminished. This may be due not only to a catalytic process which occurs in naphthalin poisoning, but to a direct lens lesion. In normal aqueous no reversible oxidized ascorbic acid is present, but it is present in case of disturbed lens metabolism, as in cattle cataract and after naphthalin poisoning. It is present in amount equal to that in the blood, which proves that the aqueous receives it from the blood. The lens reduces it to vitamin C by withdrawing hydrogen. Ascorbic acid is therefore a respiratory agent for the lens. R. Grunfeld.

Nordmann, J. **Physicochemical studies on the normal and pathologic lens.** Arch. d'Opht., 1935, v. 52, Feb., p. 78, and March, p. 170.

This monograph, rewarded by the gold medal of the Concours International Cirincione, 1934, reviews and summarizes the past work done in this field. Then follows the report of the author's original investigations. He concludes: (1) The cryoscopic point of the normal lens has an average of —0.55° (extreme limits —0.51° and —0.63°); that of the cataractous lens varies from —0.50° to —0.61° and has an average of 0.54°. (2) The p_H of the normal lens has an average of 7.4 (7.0 to 7.85); that of spontaneous cataract is 7.3 (6.8 to 7.7); while in naphthalin cataract the p_H is increased to 7.8 (7.4 to 8.3). (3) The neutralization curves of the normal lenses present important variations between p_H 4 and 5, and between p_H 8 and 9.5. The curves of opaque lenses are no different. (4) The cataphoresis of normal lenses very often shows an isoelectric point in the neighborhood of p_H 6. In cataract this point increases and approximates the p_H of the normal lens. (5) The platinum and the oxidation-reduction potential of the normal lens is about +87 mV (+50 to +120 mV); it attains an r_H 17.8 at a p_H 7.4. The corresponding numbers in cataract are +166 mV (+144 to +176 mV) which corresponds to an r_H 20.3 at a p_H 7.3. (6) The buffer power of oxidoreduction is important in the normal lens and the plateau is found between +165 and +120 mV. The plateau persists in naphthalin cataract. It is abolished or at least altered in senile human cataract. (7) The minimum swelling of the lens immersed in solutions of various p_H is found at p_H 6. At the p_H and at Δ of the normal lens the swelling is marked. It sharply decreases however in a solution of half reduced cresyl blue, being then at an r_H about that of the normal lens. (8) The evolution of a cataract is characterized by a series of phenomena related to oxidoreduction. At the same time alteration of the protides with shifting of the p_Hi (and perhaps, in spontaneous cataract, also of the p_H) is observed. (Bibliography.)
Derrick Vail.

O'Brien, C. S., Molsberry, J. M., and Allen, J. H. **Diabetic cataract.** Trans. Sec. on Ophth., Amer. Med., Assoc., 1934, 85th session, p. 217. (See Amer.

Jour. of Ophth., 1934, v. 17, Dec., p. 1186.) George H. Stine.

Poyales and Morena. **Morphology of the hyaloid membrane after intracapsular cataract extraction.** Bull. Soc. Franç. d'Opht., 1934, 47th year, pp. 211-217.

The authors modified the slitlamp by substituting a cross for the usual slit. The hyaloid membrane was studied in 794 cases, of which more than one-half were of extraction by the Smith method, Barraquer and Kalt forceps extractions making up the remainder. Complete and partial rupture of the hyaloid were observed, the former being associated with operative loss of vitreous. The intact hyaloid was subject to many distortions, as well as sacklike deformity of the upper portion in cases with iridectomy. A smooth hyaloid was most frequently associated with the Barraquer extraction, but this type also had a higher percentage of loss of vitreous. The Smith method was accompanied by deformed hyaloid and frequent loss of vitreous. The Kalt extraction results were intermediate between the Barraquer and Smith methods, but capsule rupture occurred in 26.5 percent. A spontaneous rupture of the hyaloid was observed several months after operation.

P. J. Leinfelder.

Rones, Benjamin. **Anterior lenticonus.** Sec. on Ophth., Amer. Med. Assoc., 1934, 85th session, pp. 175-185. (See Amer. Jour. Ophth., 1934, v. 17, Nov., p. 1081.)

Waelsch, Heinrich. **As to the chemistry of black cataract.** Arch. f. Augenh., 1934, v. 108, June, p. 443.

A fifty-nine-year-old patient had black cataract in each eye. The lenses, extracted intracapsularly, were of cheesy consistency, dark-black in the centers, a diaphanous dark brown at the margins.

Water and protein were present in the same ratio as in other cataractous lenses. The SH content had disappeared as in other old or cataractous lenses. Spectroanalysis placed the pigment in the melanin group. The author expresses his belief regarding the formation of melanin. It is of high significance that the SH group has disappeared from the lens, and that the other protein, crystallin ß, richest in sulphur, has become insoluble.

R. Grunfeld.

10. RETINA AND VITREOUS

Arruga, H. **Rest after operations for detachment of the retina.** Bull. Soc. Franç. d'Opht., 1934, v. 47, pp. 352-357.

Ocular as well as general rest is required. The author obtains the former by suturing the inferior rectus muscle to the lid, or by means of an orbital injection of blood. If necessary the latter is repeated to keep the eye immobile. The patient is allowed to sit up on the third day if he is uncomfortable.

P. J. Leinfelder.

Bacsich, P., and Gellert, A. **The structure and function of the pecten in the eyes of birds.** Graefe's Arch., 1935, v. 133, p. 448.

The length of the base of the pecten corresponds, except in the case of the owls, to the diameter of the cornea. The ground substance of the pecten contains no glial elements, nerve fibers, or nerve endings. The ground substance of the pecten is composed of cells of connective tissue (mesodermal) origin. A large part of the comparatively small cells contain brown grains of melanin. The fibers of the ground substance are collaginous and reticular. The blood vessels of the pecten may be designated as modified capillaries, consisting of endothelium and a thick inelastic connective tissue. The function of the pecten depends upon its vessels and is most probably to keep the bird's eye warm or to protect it from chilling.

H. D. Lamb.

Bencini, A. **Diathermocoagulation in the treatment of retinal detachment.** Boll. d'Ocul., 1934, v. 13, June, pp. 725-741.

The writer reports eight cases of retinal detachment, six with visible

tear. Seven were in myopia. One was operated on by the Lindner-Guist and the others by the Weve method. The writer describes the technical details of diathermic coagulation as done by him, with permanent recovery in all cases. (Ten figures, seven in color.)

M. Lombardo.

Bietti, G. B. **Episcleral cryocauterization as a therapeutic method in retinal detachment.** Boll. d'Ocul., 1934, May, pp. 576-617.

The writer describes the changes brought about by the freezing effect of his "cryocautery" applied on the sclera, as seen ophthalmoscopically and histologically in artificially produced retinal detachment in fifteen rabbits. He applied his method to fourteen patients, obtaining a complete reattachment at the first or second treatment in ten cases, seven of which showed permanent recovery. He concludes that cryotherapy is simple and inexpensive, does not damage the sclera or the lens, and can be reapplied at short intervals. The tear or the zone around it can be easily reached, and the method can be applied in cases of multiple tear or where no tear is visible. (Bibliography, twenty-seven figures, eight in color.)

M. Lombardo.

Cole, Marshall. **Further technique in the operative treatment of detached retina.** Trans. Ophth. Soc. United Kingdom, 1934, v. 54, p. 197.

The author advises the use of colored charts, making a careful drawing of the condition of the fundus before any operative procedure. He also uses some of the barbituric group for aiding anesthesia. The use of the smallest needles is advised, placing the punctures well behind the peripheral margin of the tear. If enough subretinal fluid is not being let out, a larger needle should be used or a trephine for opening the sclera, and the choroid scratched with a small Nettleship lacrimal dilator.

Beulah Cushman.

Coppez, L. **Experimental choroiditis induced by pyrometric electrode (scleral diathermy).** Bull. Soc. Franç. d'Opht., 1934, 47th year, pp. 327-338.

The author studied the effects of external diathermy in two eyes which were to be enucleated for sarcoma. In the first case the eye was treated at three places, each for twenty seconds, with 70°, 80°, and 90° (Centigrade). The eye was enucleated immediately and the histology noted. Reaction was greatest in the 90° treatment but did not appear severe. The second eye was treated at 80° and observed until the ninth day when it was enucleated. The inflammation was severe, and the retina was practically destroyed. The lesson deduced by the author is that the difference between the immediate ophthalmoscopic appearances of lesions produced at the three temperatures named is difficult to evaluate, and that exact dosage is only possible by controlling the temperature with his pyrometric electrode.

P. J. Leinfelder.

Dejean, C. **Hemorrhage in Cloquet's canal.** Bull. Soc. Franç. d'Opht., 1934, 47th year, pp. 219-227.

Sudden decrease in vision in both eyes occurred in a woman of forty-nine years. Symptoms of apoplexy were present. Ophthalmoscopy showed a large centrally placed opacity suspended in the vitreous of each eye. After ten months the hemorrhage was absorbed. The author believes it was due to intracranial bleeding which advanced through the vaginal sheaths and cribriform plates to the vitreous cavities.

P. J. Leinfelder.

Fritz. **Different physiopathologic types of retinal circulation.** Bull. Soc. Franç. d'Opht., 1934, v. 47, pp. 361-369.

The effects upon the retinal circulation of four types of hypertension are described. These are hypertension with increased arterial tonus, hypertension with increased arteriolar tonus, hypertension with arteriolar hypotonus, and hypertension with capillary atony. The author feels that a study of the fundus can aid in diagnosing the general vascular condition.

P. J. Leinfelder.

Genet, L. **Evolution of chorioretinal scars obtained by external diathermy in retinal detachment.** Bull. Soc. Franç. d'Opht., 1934, 47th year, pp. 316-326.

In a previous report the author described the evolution of the retinal scars resulting from perforating diathermy. A study is made of the cicatrices following external diathermy, and it is found that they are pigmented and permanent. Advantages of the external method are absence of hemorrhage, intact sclera, and possibility of repeated intervention.

P. J. Leinfelder.

Gonin, J. **The beginning of retinal detachments.** Bull. Soc. Franç. d'Opht., 1934, 47th year, pp. 209-215.

The author insists that tears result from traction of vitreous bands upon the retina. P. J. Leinfelder.

Lambert, R. K. **A method for the study of the retinal circulation.** Arch. of Ophth., 1934, v. 12, Dec., pp. 868-873.

By this method it is possible to study the fundi of animals under relatively high magnification and to measure and photograph physiologic changes in the retinal vessels. The fundus is viewed through a Leitz Ultropak microscope, with a self-contained illuminating system mounted on an adjustable stand and fitted with a Leica camera. A cool, red-poor light is obtained by an Aklo glass filter. The corneal curvature is neutralized by a flat-surfaced contact glass held in place by an adjustable holder and separated from the cornea by liquid petrolatum. (Photographs.)

J. Hewitt Judd.

Lewkojewa, E. F. **Histologic changes in the eye after Gonin's operation.** Graefe's Arch., 1935, v. 133, p. 467. (See Amer. Jour. Ophth., 1935, v. 18, Feb., p. 199.)

Lijo Pavia, J. **Localization and treatment of tears at the posterior pole in retinal detachment.** Rev. Oto-Neuro-Oft., 1934, v. 9, Oct., p. 332.

In tears at the posterior pole localization by means of fundus photography offers more precision, since the distance from the nerve can be measured on the photograph. But the meridians have to be referred to the optic nerve and not to the fovea. By means of precise localization and the employment of the author's special electrodes two cases with tears 4 mm. and 6 mm. from the nerve were closed. (Illustrated.)

M. Davidson.

Lindner, K. **Remarks on the article "Histologic changes in the eye after Gonin's operation" by Dr. Lewkojewa.** Graefe's Arch., 1935, v. 133, p. 476.

This was the only eye operated upon by Gonin's method up to the end of 1929 that was lost through atrophy. Since in three other cases of high myopia successful cauterizations for retinal detachment were performed, at less distance from the limbus and with longer duration than in the case under discussion, three cauterizations being performed in each of two cases within a single month, Lindner concludes that the method of operating in the case under discussion cannot be the only cause of the unsuccessful outcome. The author thinks the principal complication leading to loss of an eye after operation is intraocular hemorrhage.

H. D. Lamb.

Mehlmack, Friedrich. **A contribution to the question of embolism of the central artery of the retina and its branches.** Zeit. f. Augenh., Feb., 1935, v. 85, p. 213.

In a patient with mitral stenosis, a clearly visible embolus became lodged in the inferior temporal artery, caused an area of milky opacity in the retina, blindness of all but the central one or two degrees of the superior nasal quadrant, and a paracentral scotoma connected with the blind spot. Preexistent lesions of the retinal blood vessels were not demonstrable. After three weeks the embolus had become canalized and circulation reestablished. The retina became clear, though the vessels in the area were thinner. The scotoma became smaller and all but the peripheral ten to fifteen degrees of the blind quadrant recovered normal function. The author

points out that reestablishment of function does not indicate that the circulation had not been totally interrupted by the embolus. F. Herbert Haessler.

Schoenberg, M. J. **Retinal detachments. Clinical experiences with the diathermic treatment.** Arch. of Ophth., 1934, v. 12, Nov., pp. 709-729; also Sec. on Ophth., Amer. Med. Assoc., 1934, 85th session, p. 17.

This report is based on twenty-three cases treated by diathermy, with success in fourteen and failure in nine. Three failures and six cases with reattachment are reported in detail and all are summarized in tables. Drawings show the appearance of the fundus and location and number of punctures. The causes of failure are chiefly long duration, with degeneration of the retina and vitreous, and technical errors. The author now uses a combination of the cutting and coagulation techniques. (Discussion.) J. Hewitt Judd.

Serr, Hermann. **Observations on the circulation of the blood in the retinal vessels and their anomalies in a case of exudative retinitis.** Graefe's Arch., 1935, v. 133, p. 508.

An eighteen-year-old male patient had noted a visual disturbance in the right eye for three and a half years. The left eye was normal. Right vision was uncertain of hand motion, with imperfect light projection. The retina was considerably detached and thickened with exudate. When the retina lying just behind the lens was examined with a slitlamp equipped with a microarc lamp, the larger venous trunks showed grayish-white stripes and several constrictions along their course. There were numerous direct anastomoses between arteries and veins, and many miliary aneurisms along the arteries and the veins, mostly in the very small vessels. The author studied the movement of the blood in the aneurisms, also the effect of cocaine with adrenalin and of atropin upon the blood stream in the small blood vessels.

H. D. Lamb.

Shapland, C. D. **Retinal detachment in aphakia.** Trans. Ophth. Soc. United Kingdom, 1934, v. 54, p. 176.

From 1930-1933 inclusive, 651 cases of simple detachment of the retina were admitted to the wards of Moorfields Eye Hospital, and of these 50, or 7.68 percent, occurred in aphakic subjects. The average interval between cataract extraction and the onset of detachment was 3.4 years. Etiologically the cases could be divided into the following groups: traumatic, myopic, vitreous loss, and a small series in which no factor other than that of aphakia could be elicited.

The essential mechanism in the vitreous group is considered to be incarceration of normal vitreous in the Graefe section, and slow contraction of this toward the scar in the process of cicatrization, with resultant upward traction on the retina in the lower half of the globe by the adherent inferoperipheral portion of the vitreous body, which eventually occasions retinal detachment in this situation. Retinal detachment occurring twenty-two times after discission of the lens could be divided into two clinical groups, those in which gradual stretching of the globe had taken place since needling, and those in which the refraction had apparently remained static.

Beulah Cushman.

Sorsby, Arnold. **Retinal abiotrophy.** Trans. Ophth. Soc. United Kingdom, 1934, v. 54, p. 160.

Retinal abiotrophy was defined by Mott as premature death of neurons owing to an inherited or acquired lack of durability. A comprehensive review of the retinal abiotrophies as so called by the author, namely retinitis pigmentosa, macular dystrophies, gyrate atrophy, central and paracentral dystrophy, angioid streaks, Doyne's choroiditis, central and paracentral tapetoretinal dystrophy, and hereditary optic atrophy, is given. The retinal dystrophies associated with systemic affections such as Tay-Sachs and Batten-Mayou diseases and the Lawrence-Moon-Biedl and Grönblad syndromes are discussed.

Beulah Cushman.

Stary, Z., and Winternitz, R. **As to the chemistry of the vitreous.** Arch. f. Augenh., 1934, v. 108, June, p. 433.

The vitreous and the aqueous contain an equal proportion of Na and K. In the aqueous there is a little more Cl and twice as much P present as in the vitreous. If the vitreous and aqueous are only separated by an osmotic membrane the difference disappears by osmosis. The vitreous contains a great amount of organically bound phosphoric acid. R. Grunfeld.

Swett, W. F. **Reflex spasm, simulating embolus of the central retinal artery.** Amer. Jour. Ophth., 1935, v. 18, April, pp. 359-360.

Vogt, A. **Detachment of the retina. Treatment with the electrolysis needle.** Arch. of Ophth., 1934, v. 12, Dec., pp. 842 (See Amer. Jour. Ophth., 1935, v. 18, April, p. 401.)

Wagener, H. P. **Lesions of the optic nerve and retina in pregnancy.** Jour. Amer. Med. Assoc., 1934, v. 103, Dec. 22, p. 1910. (See Section eleven, Optic nerve and toxic amblyopias.)

Walls, G. L. **Human rods and cones.** Arch. of Ophth., 1934, v. 12, Dec., pp. 914-930.

This review deals with histology of the rods and cones as to size and form, absolute and relative number, relationship to contiguous structures, and cystology and cytogeny, and with their function as to locus of reception, vision per se, and color vision. (Photomicrographs, bibliography.) J. Hewitt Judd.

Walls, G. L. **The visual cells of lampreys.** Brit. Jour. Ophth., 1935, v. 19, March, p. 129.

Introductory remarks discuss the nature of the visual cells of these most primitive of living vertebrates. In the lamprey's retina we are not dealing with "undifferentiated" cells; nor can it be considered either pure-rod or pure-cone, for both rods and cones are present. This makes it impossible to rely upon comparative adult histology to solve the problem of the order in which the rods and cones originally evolved.

D. F. Harbridge.

Wright, R. E. **Familial macular degeneration.** Brit. Jour. Ophth., 1935, v. 19, March, p. 160.

The author has observed certain macular changes which may be described as "beaten brass or silver," "coppery sheen," and so on, which he has regarded as familial degenerations. He presents a family group of six, father and mother of Indian Portuguese descent, their three sons, and one daughter. The three boys, aged fourteen, twelve, and eleven years respectively, showed marked deterioration of sight at eight years. Vision was 6/60. The media were clear but the whole macular regions showed an ill-defined tarnished-brass or metalic-sheen appearance. An indefinite mottling surrounded the macular area. The discs were of somewhat yellowish color but definitely not atrophic. X-ray pictures of the skulls all showed remarkable length and narrowness, and there was mental deficiency. The father, mother, and daughter aged eight years were said to have normal vision. The father and daughter did not have long narrow heads, but the mother did.

D. F. Harbridge.

11. OPTIC NERVE AND TOXIC AMBLYOPIAS

Ancona, Stella. **Persistence of Szily's primitive epithelial optic disc.** Nederlandsch Tijdschrift voor Geneeskunde, 1935, Jan. 12.

In 1908 de Vries described a patient who he considered had a persistent hyaloid artery. In 1914 an eleven-year-old child died in the neurologic clinic. At autopsy several tumors (neurofibroma, endothelioma) were found in the nervous system, including a malignant tumor of the sheath of the left optic nerve. In this eye a retinal fold was found. The anterior part of this fold was examined in transverse sections. A prolongation of the optic nerve extending into the interior of the eye was found. The retina covered this projection and hung down from it. This strand of nervous tissue extended into the nerve-fiber

layer of the retina, comparably to the extension of the optic nerve into this layer at the papilla in the normal eye. The displaced entrance of the optic nerve was not behind the retinal fold, but somewhat lateral. The malformation is considered as due to arrested development, a persistence of the primitive epithelial optic disc (Szily).

E. E. Blaauw.

Gasteiger, H. **Malaria treatment for tabetic optic atrophy.** Arch. f. Augenh., 1934, v. 108, June, p. 471.

Twenty-one cases of tabetic or taboparetic optic nerve atrophy were treated with malaria. In thirteen cases the process remained stationary for a time, or slow and gradual loss of vision resulted. In none of the cases was improvement of the vision noted. In eight cases the vision became rapidly worse. It could not be ascertained how much this was due to the treatment, since untreated cases likewise lost their vision rapidly. Since, however, with this treatment no important improvement can be achieved, the malaria treatment is not indicated in these cases.

R. Grunfeld.

Levine, J. **Pellagra as a cause of optic neuritis. Report of a case.** Arch. of Ophth., 1934, v. 12, Dec., pp. 902-909.

A woman aged forty-seven years was found to have bilateral exudative optic neuritis with exudate and hemorrhages in the adjacent retina, accompanied by central scotomata. She was an alchoholic and presented stomatitis and dermatitis, accompanied by diarrhea and severe mental depression. Marked recovery followed a high protein diet with vitamin B_2 and restriction of alcohol. The incidence and general characteristics of pellagra are discussed together with the eye symptoms. (Bibliography.)

J. Hewitt Judd.

Lillie, W. I., and Adson, A. W. **Unilateral central and annular scotoma produced by callus from fracture extending into optic canal.** Sec. on Ophth., Amer. Med. Assoc., 1934, 85th session, p. 90. (See Amer. Jour. Ophth., 1935, v. 18, March, p. 297.)

Löffler, Ann. **Results after treating tabetic optic atrophy according to Hamburg.** Zeit. f. Augenh., 1935, Feb., v. 85, p. 197.

Hamburg suggested intramuscular injection of a 0.25 potassium permanganate solution three times weekly for tabetic optic atrophy. In analogy with atrophy following methylalcohol poisoning, he thought it possible that tabetic optic atrophy might result from inhibition of oxidation. The author treated sixteen carefully selected patients for eighteen months or more and carefully followed visual acuity and fields. Some patients noted a sense of well-being after treatment, and in no case was any harm done. The seven cases of pure tabetic atrophy which before treatment were stationary or were degenerating very slowly in the better eye, lost little or nothing in the eighteen months of therapy. This is striking, since the second eye usually follows the first by a few months or at most two years. Occasionally one finds longer remissions and it is possible that all seven patients had these rare remissions. Patients seen in a stage of acute degeneration were not helped by the treatment.

F. Herbert Haessler.

Löwenstein, A. **Optic atrophy and binasal hemianopia through sclerotic basal cerebral vessels.** Med. Klin., 1935, v. 31, Feb. 8, pp. 176-179.

Binasal hemianopia may be caused by symmetric lesions around the chiasm, such as gummata, meningitic exudate, periostitic lesions, primary or secondary hydrocephalus internus, and sclerotic basal cerebral vessels. At three places the sclerotic carotid artery may damage the nerve by pressure: (1) immediately behind the bony optic canal, where the ophthalmic artery enters the nerve; (2) at the sharp upper edge of the fibrous part of the optic canal against which the ascending carotid artery presses the nerve; (3) between canal and chiasm where the anterior cerebral artery crosses the carotid artery below and above the optic nerve.

In a patient aged seventy years the only ophthalmic findings were slight pallor of both discs and a binasal hemianopic defect in the color fields. The roentgen picture of the skull showed typical bilateral atheroma of the carotid artery. Bertha Klien Moncreiff.

Magitot, A. **Carotid sympathectomy.** Ann. d'Ocul., 1934, v. 171, Nov., pp. 897-934.

The general physiology of the cervical sympathetics is discussed. The technique and effects of carotid sympathectomy are described. After unilateral sympathectomy there is generally a slight Horner's syndrome with an increase in lacrimation on the operated side, bilateral dilatation of the retinal blood vessels, and oscillations of retinal blood pressure.

The six cases of optic atrophy for which carotid sympathectomy was performed were as follows: Leber's optic atrophy, two cases of luetic atrophy, atrophy due to retinal vascular lesions, retinitis pigmentosa, and toxic amblyopia from carbon disulphide. In all of these cases there was definite improvement in visual acuity and in the size of the visual fields following sympathectomy. Magitot suggests that the operation might be performed in cases of spasm of the retinal arteries and of ophthalmic migraine.

John C. Long.

Voris, H. C., Adson, A. W., and Moersch F. P. **Tumors of the frontal lobe.** Jour. Amer. Med. Assoc., 1935, v. 104, Jan. 12, p. 93.

This is a study of clinical observations on a series of 314 cases of tumor of the frontal lobe in which the tumor was verified microscopically. Visual disturbance of some sort was present in forty-three percent of all cases, and in sixty-seven percent of those in which the tumor was known to involve only the prefrontal-frontal area. Choked disc, from one diopter to a maximum of seven or eight diopters, was found in sixty-two percent of all cases and in seventy-nine of those in which the neoplasm was confined to the prefrontal and frontal area alone. Perimetric field defects were present in thirty-two percent of the cases. External ocular palsies, usually of the external rectus, were present in about one-fifth of the entire series. Nystagmus occurred in thirteen percent. (Six tables, discussion.)

George H. Stine.

Wagener, H. P. **Lesions of the optic nerve and retina in pregnancy.** Jour. Amer. Med. Assoc., 1934, v. 103, Dec. 22, p. 1910.

The lesions of the retina and optic nerve which occur in pernicious vomiting of pregnancy indicate a severe grade of general toxemia that may prove fatal even if pregnancy is terminated promptly. Earlier and more frequent ophthalmoscopic examinations in these cases may serve to give a timely warning that the pregnancy should be interrupted.

The development of any type of retinitis in a case of hypertensive toxemia of pregnancy is an urgent indication for termination of pregnancy, not only because of the danger to vision, but also because of the implied certainty of permanent injury to the general vascular system. It appears that in cases in which retinitis develops before the twenty-eighth week there is only about a twenty-five-percent chance of the patient giving birth to a living baby, even if the pregnancy is continued to the stage of viability, and there is almost a one-hundred-percent risk of permanent cardiovasculorenal injury developing. Angiospastic lesions of the retinal arterioles, either primary or superimposed on previous organic changes, should be watched for, and pregnancy should be terminated if possible while the arteriolar lesions are still in the angiospastic phase, and certainly at the first indication of the onset of retinitis. (Three tables and discussion.)

George H. Stine.

12. VISUAL TRACTS AND CENTERS

Dubois, A. **Glaucoma or ocular hypertension in a pregnant woman.** Ann. d'Ocul, 1935, v. 172, Feb., pp. 142-148.

A woman of thirty-two years, about

one month pregnant, developed an increase in intraocular pressure. Visual acuity and visual fields were normal. The tension was largely controlled by pilocarpin and a salt-free diet. Later, by the Evans method of angioscotometry, a definite enlargement of the blind spot could be demonstrated. At the sixth month of pregnancy the patient had a spontaneous miscarriage of twin fetuses. Thereafter there was no further visual disturbance. John C. Long.

Elsberg, C. A., and Dyke, C. G. **Meningiomas attached to the mesial part of the sphenoid ridge; with syndrome of unilateral optic atrophy, defect in visual field of same eye, and changes in sella turcica and in shape of interpeduncular cistern after encephalography.** Arch. of Ophth., 1934, v. 12, Nov., pp. 644-675.

Four cases presenting this syndrome are reported in detail. In all the chief or only complaint was of slowly progressive loss of vision. The visual defect varied with the location of the growth. In three cases the growth was proved histologically to be typical meningeal fibroblastoma. Early recognition of the eye changes and of the deformity of the chiasmal and interpeduncular cisternae will permit removal of the growths when they are of small size. The paper is well illustrated with drawings, perimetric charts, and encephalograms. (Discussion.)

J. Hewitt Judd.

Levitt, J. M. **Unilateral ophthalmoplegia totalis; parasellar osteochondroma. Report of a case.** Arch. of Ophth., 1934, v. 12, Dec., pp. 877-886.

A woman aged twenty years presented almost complete ptosis, total ophthalmoplegia and proptosis of the left eye, and bilateral corneal hypesthesia. At operation, a primary osteochondroma was found at the junction of the left sphenoid ridge and the anterior clinoid process. Two months after operation the ptosis disappeared and the function of the external and internal recti muscles was partly restored. The literature is reviewed and the differential diagnosis of basal ophthalmoplegias is considered. J. Hewitt Judd.

Magitot, A. **Carotid sympathectomy as therapy in certain degenerative lesions of the optic nerve and retina.** Bull. Soc. Franç. d'Opht., 47th year, 1934, pp. 381-390.

Bilateral carotid sympathectomy gives prolonged increased vascular hypertension. The primary result of unilateral section of the carotid plexus is transitory hypertension which is followed by a period of hypertension. In a few days the tension again falls only to be followed by a stage of alternating hypertension and hypotension. The operation is useful in treating atrophic conditions of the optic nerve and retina. Observations on six cases are recorded. Improvement in vision was noted in all.

P. J. Leinfelder.

Soria. **The optic chiasm in the school of Cajal.** Arch de Oft., Hisp.-Amer., 1934, v. 34, Dec., pp. 662-670.

The author expresses briefly the conceptions of Cajal and his pupil, Marquez, as to the optic chiasm. (Eleven illustrations). Ramon Castroviejo.

Vonderahe, A. R., and Abrams, N. R. **Ependymoma of third ventricle. Report of a case with extension into the optic chiasm and with widespread vegetative manifestations.** Arch. of Ophth., 1934, v. 12, Nov., pp. 693-698.

A man aged forty years presented failing vision and hearing accompanied by increased intake and output of fluids, sexual impotence, increased pigmentation of skin, lethargy, and premature graying of hair followed by baldness. Subtentorial craniotomy and exploratory craniotomy failed to reveal the tumor, and death occurred. Autopsy disclosed a tumor obliterating the third ventricle, with hemorrhage into the mass, cerebral edema and congestion, and internal hydrocephalus of both lateral ventricles secondary to obstruction of the aqueduct of Sylvius. The vegetative manifestations resulted from pressure or invasion of the tuber cinereum

and of the floor and walls of the third ventricle. (Photographs).

J. Hewitt Judd.

Voris, H. C., Adson, A. W., and Moersch, F. P. **Tumors of the frontal lobe.** Jour. Amer. Med. Assoc., 1935, v. 104, Jan. 12, p. 93. (See Section 11, Optic nerve and toxic amblyopias.)

13. EYEBALL AND ORBIT

Caramazza, F. **Voluminous angiomata of the upper lid treated with surgical diathermy.** Boll. d'Ocul., 1934, v. 13, June, pp. 742-753.

A woman of fifty-nine years showed two big angiomata of the right upper lid, of which one, pedunculated, was removed with the diathermy knife, the other, with a large base, was first treated with coagulating multiple punctures three times at varying intervals of time and was then enucleated with the same knife, saving the overlying skin with satisfactory result from the esthetic and functional standpoints. Histologic examination of the tumors demonstrates the changes caused by the diathermic coagulation. (Bibliography, eleven figures.) M. Lombardo.

Dusseldorp, M. **Two cases of accidental penetration of caustic liquids into the orbit from the nose.** Rev. Oto-Neuro-Oft., 1934, v. 9, Dec., p. 402.

In one a five percent solution of zinc chloride applied to the frontal sinus after a Vacher operation penetrated the orbit and destroyed the upper lid and the eye, which had to be enucleated. In another case injection of alcohol into a resected middle turbinate for neuralgia a month after an ethmoidal operation produced complete internal rectus paralysis which cleared up in five months. Attention is called to the use of caustic liquids in the cavities neighboring on the orbit after operations which are likely to leave defects in the walls separating these structures.

M. Davidson.

Morax, V. Traumatic enophthalmos. Bull. Soc. Franç. d'Opht., 47th year, 1934, pp. 391-394.

Observations on three cases of traumatic enophthalmos are noted. The author mentions the causes of the condition and feels that early surgery might prevent it. P. J. Leinfelder.

Oberhoff, Kurt. **Ophthalmologic symptoms in Schüller-Christian disease.** Arch. f. Augenh., 1934, v. 108, June, p. 464.

The author presents three cases. A seven-year-old girl had a slowly progressive swelling on the left temporal region, and exophthalmos of the left eyeball. The orbital margin was smoothly thickened. Movements of the eyeball up and out were impaired. Vision and eyeground were normal. X-ray showed rarefactions in the left temporal bone. Two series of x-ray treatments of 670 percent skin erythema dose were followed by such marked improvement that Schüller-Christian disease was surmised. Blood serum showed 210 mg. per 100 gm. cholesterin.

A seventy-year-old woman had in the temporal region a smooth elastic tumor which was connected with the orbital wall. It had started thirty-five years earlier after a slight trauma, but remained stationary for thirty years. There was exophthalmos of the left eye. Vision and eyeground were normal. X-ray showed defects in the lateral orbital wall. The cholesterin content of the blood serum was 255 mg. per 100 gm.

A 50-year-old woman had developed convergent strabismus and ptosis of the right eye for the past year. Gradually paresis of all extrinsic and intrinsic eye muscles developed. The right facial and trigeminal nerves and the taste sense showed impairment. There was slight paresis of the left arm. X-ray of the skull was negative. Three months later deafness developed. X-ray revealed rarefaction in the petrous portion of the temporal bone, and biopsy of that bone revealed granulation tissue with large xanthoma cells. Blood-serum cholesterin was 267 mg. per. 100 gm.

R. Grunfeld.

Ourgaud and Sédan. **A second case of bilateral anophthalmos in the same family.** Bull. Soc. Franç. d'Opht., 47th year, 1934, pp. 398-400.

The author previously reported a case in this family. Lues was present, but after treatment there were three normal children. After lapse of treatment this anophthalmic child was born. Hereditary eye defects were present in the ascendents. P. J. Leinfelder.

Poulard, A. **Surgical treatment of entropion originating at the external angle.** Ann. d'Ocul. 1935, v. 172, Feb., pp. 97-105.

Poulard describes a new operation for correction of entropion. The procedure consists of external canthotomy followed by freeing of the conjunctiva at the angle; and excision of a slight amount of conjunctiva of the lower lid margin and fixation by sutures. The operation is simple and uniformly successful. John C. Long.

Terry, T. L. and Mysel, P. **Pulsating exophthalmos due to internal carotid-jugular aneurism: The use of thorium dioxide sol in localization.** Trans. Sec. on Ophth., Amer. Med. Assoc., 1934, 85th session, p. 187 (See Amer. Jour. Ophth., 1935, v. 18, May, p. 491.)

14. EYELIDS AND LACRIMAL APPARATUS

Alvis B. Y. **Blepharochalasis.** Amer. Jour. Ophth., 1935, v. 18, March, pp. 238-245; also Trans. Sec. on Ophth., Amer. Med. Assoc., 1934, 85th session, p. 202.

Delord, Colin, and Dejean. **The ectropion operation of Truc.** Arch. d'Opht., 1934, v. 51, Dec., p. 763.

In 1895 Truc described an operation for spastic and senile ectropion which has become forgotten. It consisted of splitting the lid into two parallel strips by an intermarginal incision 2 mm. behind the cilia from internal to external canthus. The lid is thus completely divided into two sheets, anteriorly the skin and orbicularis, posteriorly the tarsus and conjunctiva. The sheets of tissue are then fixed into a new position with a doubly armed suture, elevating the anterior sheet in ectropion, the posterior one in entropion. In the last event Colin found it desirable to graft a piece of skin from the same lid over the denuded tarsus. Numerous patients were operated upon by the authors with complete success. (Illustrations, bibliography.) Derrick Vail.

Ortiz, J. M., Jr., **The importance of radiographic examination in the pathology of the lacrimal passages.** Arch. de Oft. Hisp-Amer., 1935, v. 35, Feb., pp. 57-77.

The author found radiographic examination very useful to determine accurately the condition of the lacrimal sac before dacryocystorhinostomy. The technique used is that advocated by Unterberger and Bormacher, who injected iodipin and neoiodipin into the sac and simultaneously packed the nose with the same substances. A film is obtained demonstrating very clearly the thickness of the lateral nasal wall and the presence of ethmoidal pneumatic cells. After operation more roentgenograms are taken to determine success or failure. When operation is not possible, the author has found that the injections of iodipin and neoiodipin considerably improve the condition. (Fourteen illustrations, bibliography.)

Ramon Castroviejo.

Sevillano. **An interesting case of dacryosolenon.** Arch. de Oft. Hisp-Amer., 1935, v. 35, Feb., pp. 88-92.

The author's technique was reviewed in the American Journal of Ophthalmology, 1934, v. 17, p. 672. The author reports one more case in which operation was performed on both sacs with complete restoration of function. A slight modifiation of technique employs a different type of cannula, buried in the sac. This cannula is afterwards removed by probing the canaliculi in the usual way to force the cannula down through the nasolacrimal duct.

Ramon Castroviejo.

NEWS ITEMS

Edited by Dr. H. Rommel Hildreth, 640 S. Kingshighway, St. Louis

News items should reach the Editor by the twelfth of the month.

Deaths

Dr. Colman Ward Cutler, New York City, aged 72 years, died March 18, 1935, at St. Luke's Hospital.

Dr. Herman Frederick William Flock, Williamsport, Pa., aged 39 years, died March 6, 1935, of cellulitis.

Dr. Douglas Fox Wood, Minneapolis, Minn., aged 60 years, died February 9, 1935, of coronary occlusion.

Miscellaneous

The Leslie Dana Gold Medal, awarded annually for outstanding achievements in the prevention of blindness and the conservation of vision, was presented this year to Dr. William H. Wilder of Chicago, who was selected for this honor by the National Society for the Prevention of Blindness in cooperation with the St. Louis Society for the Blind.

The medal, offered annually by a director of the St. Louis Society, is a prized mark of recognition of service for the conservation of vision. It was presented to Dr. Wilder at ceremonies in St. Louis on May 18. The medal bears the inscription: "Wise Clinician, Devoted Teacher and Humanitarian."

Dr. Wilder is secretray-treasurer of the American Board of Ophthalmology; vice-president of the Illinois Society for the Prevention of Blindness; professor emeritus of ophthalmology at Rush Medical College, University of Chicago; and a past president of the American Academy of Ophthalmology and Otolaryngology.

The Leslie Dana Medal was awarded last year to Professor F. de Lapersonne of Paris, president of the International Association for Prevention of Blindness.

The Orthoptic Clinic at the Episcopal Eye, Ear, Nose and Throat Hospital, Washington, D.C., will admit through the Medical Board applications for training in orthoptic technic of those young women having acceptable character, education, and adaptability for such training. After a year's training, if they are acceptable to the Board, they will be given certificates of graduation to practice as orthoptic technicians. They will be ethically trained and will take patients for treatment on physician's prescription only.

Dr. Karl Lindner of the University of Vienna delivered a course of lectures before the Washington, D.C., Ophthalmological Society, from April 22 to 26 inclusive, which included an operative clinic. These lectures, which were exceedingly stimulating and practical, were attended by a great many men from states contiguous to Washington. Among the out-of-town visitors were Dr. Emory Hill, Dr. Robert H. Courtney, and Dr. Ralph Thomason of Richmond; Dr. Ray K. Daily of Houston, Texas; Dr. Harvey Thorpe of Pittsburgh; Dr. William Mehl of Buffalo. Among those present from Virginia, West Virginia, Maryland, and North Carolina were Dr. V. M. Cox, Dr. L. M. Griffith, Dr. E. L. Jones, Dr. J. M. Lilly, Dr. T. W. Moore, Dr. Henry Sloan, Dr. Davis Sloan, Dr. William Tarun, Dr. Frank Wysor, Dr. R. S. Welch, Dr. Russell Perkins, Dr. H. H. McGuire, Dr. Harry V. Thomas, and Dr. Frederick Hoitash.

During his stay in Washington, Dr. Lindner was the house guest of Dr. William Thornwall Davis.

Dr. Manuel Uribe Troncoso is giving a course in Gonioscopy to the staff members of the Eye Institute, Columbia University. The course includes five or six lectures and practical demonstrations of normal and pathological angles. It is given to a series of groups of the ophthalmologists of the staff.

Societies

At the regional meeting of the College of Surgeons, April 11-12, 1935, in Washington, D.C., the following Washington ophthalmologists took part: Dr. William Thornwall Davis, Demonstration of the orthoptic treatment of squint in the Orthoptic Clinic, and Demonstration of the surgical treatment of squint with special reference to vertical deviation; Dr. James N. Greear, Operation for detachment of the retina; Dr. G. Victor Simpson, Surgery of glaucoma; Dr. E. Leonard Goodman, Intracapsular extraction of cataract by forceps method, and Advancement and recession operations and possible muscle transplantations for paresis of the left external rectus.

A medical organization to be known as the Mississippi Valley Medical Society was formally organized at Quincy, Illinois, on April 8. The sole purpose of the new society is to hold an annual meeting each fall devoted to intensive postgraduate instruction, conducted by the leading clinical teachers of the United States. The society will especially appeal to the physicians of Illinois, Missouri, and Iowa. Membership in the society will be open to all ethical physicians, it being a prerequisite that all members hold membership in their respective State medical societies. In order to get started quickly, the Board of Directors has elected to place the membership fee and dues for the first year at only $3.00 and life membership at $25.00, provided these are paid before the time of the annual meeting. Charter membership will

close July 1, 1935. Members will attend the annual meetings without payment of a registration fee. Ethical physicians interested in the new organization are urged to communicate with Harold Swanberg, M.D., Secretary-Treasurer, 211-224 W. C. U. Bldg., Quincy, Illinois.

Following is a copy of the program of the Eye Section of the Philadelphia County Medical Society, given May 2, 1935: Dr. J. E. Wilson, Hyperphoria treated by the O'Connor cinch operation on the superior-rectus muscle; Dr. Harry S. Weaver, Jr., Filaria Loa in lid and conjunctival sac; Dr. C. W. LeFever, The occurrence of cholesterin in the vitreous; Dr. William Egbert Robertson, Some comments on the production of cholesterin; Dr. Charles R. Heed, The surgical aspects of glaucoma.

The Brooklyn Chapter of the American College of Surgeons is planning a visit to Richmond, Va., for May 11. This is one of a series of excursions which have been given by the Chapter and are very popular among the Brooklyn ophthalmologists. The formation of local chapters of the American College of Surgeons should be encouraged, as not only is the College at large benefited but the spirit of friendliness is very much encouraged among local College Fellows. The Chapter idea also gives better representation to the ophthalmologist than he has opportunity to gain through the national channels.

The Brooklyn Ophthalmological Society held its April meeting on the evening of Thursday the 18th. Dr. Luther Peter of Philadelphia presented the paper of the evening, the title being, The diagnostic evaluation of visual-field defects. Case reports included, Neoplasm of the optic nerve head, by Dr. M. J. Buonaguro; also, Cases of tuberculosis of the choroid, by Dr. Herman Sturoke.

Personals

Dr. John O. McReynolds of Dallas, Texas, visited the Brooklyn Eye and Ear Hospital on Wednesday, April 10, to witness a demonstration of the popular Jameson operation for strabismus, at the hands of its originator Dr. P. Chalmers Jameson. Dr. McReynolds was also present at the monthly meeting of the New York Ophthalmological Society.

Dr. Charles Nelson Spratt announced that after February 22, 1935, when he would have completed thirty years of practice of ophthalmology, otology, and laryngology, he would limit his work to ophthalmology.

Dr. Charles E. Walker, Jr., announces the opening of an office for the practice of ophthalmology at 1114 Republic Building, Denver.

Dr. John Holst left New York for Oslo on May 22, 1935. After a sojourn with Professor Hagen, Dr. Holth, Dr. Holst, and Dr. Gjessing of Drammen, he will visit Professor Rönne of Copenhagen. On June 27, 28, 29 he will attend the ninth Nordisk Congress in Ophthalmology. After this he will leave for Vienna and later Lausanne. He will return to Omaha on September 15, 1935.

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